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The Oil Man's Calendar

DEC. 3	New Mexico Oil & Gas Association, Artesia.
5	Oklahoma Stripper Well Association, Tulsa.
FEB. 26–27	American Petroleum Institute Division of Production, Southwestern District, Dallas, Texas.
28	North Texas Oil & Gas Association, Wichita Falls, Texas.
APR. 15–17	American Institute of Mining and Metallurgical Engineers, Cincinnati, Ohio.
16–17	National Petroleum Association, Thirty-ninth Semi-Annual Meeting, Hotel Cleveland, Cleveland, Ohio.
21–24	American Association of Petroleum Geologists, Twenty-seventh Annual Meeting, Cosmopolitan Hotel, Denver, Colorado.

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FILES

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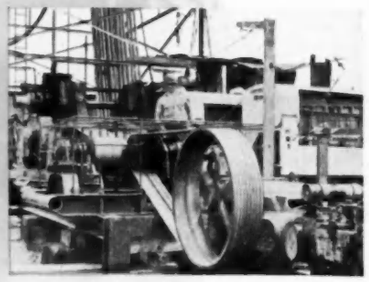

● Well drilling—well and line pumping—pipe laying... there are few industries or projects in which uninterrupted operation is so important a key factor. Which means there must be no short-sighted skimping in repair-and-maintenance tools.

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The Changing Panorama

More Oil Reserves Are Necessary

But Picture Is Not So Bad As Some Paint It

United States crude oil reserve status becomes an increasingly important matter, with consumption and production steadily rising to new all-time peaks. Oil must be found in great volumes to permit continued large consumption. The industry, OPC and everyone else familiar with the oil business, are well aware of this condition, and also for the necessity of conducting an intensive exploration campaign for new producing supply sources.

However, the situation is not as alarming as the picture painted by Deputy Coordinator Ralph K. Davies in his address before the American Petroleum Institute. In fact, some of the deputy coordinator's statements were misleading, and are likely to create another oil shortage scare of considerable magnitude.

Davies stated that the statistical method of calculating additions to reserves that has been employed is misleading, in that additions to reserves of already known fields are added each year rather than revising estimates for the year in which the discovery well was completed. He then cited figures compiled by and published in one of the industry's trade journals to show that on the basis of reserves found only in *absolutely new fields* the industry has failed by a big margin to find enough reserves to equal consumption during the years 1938, 1939, 1940 and the first six months of 1941. Additions to reserves in the form of extensions and new producing sands even for the earlier years were completely ignored by Davies. On this basis, it is doubtful if there has been a year in the history of the industry in which it has found enough oil to equal consumption—yet the United States has a reserve of 20 billion barrels. Few fields have ever had sufficient development in their discovery year to permit an estimate of their actual potential. One, two, three or even a dozen wells seldom permit accurate estimates of the reserve in a major producing structure, and usually the field is given a very small reserve for some time following discovery.

He pointed out that the article showed new discoveries during the first six months of 1941 amounted to only 92,000,000 barrels against a total production of 662,000,000 barrels, from which he concluded, "we are consuming one twentieth of our known reserves every eight months." He failed to mention that the article from which he obtained his figures estimated 477,055,000 barrels were added to reserves by extensions and new pay sands during the first six months of 1941.

This is no attempt to justify figures contained in the article, for it was the work of a competitive magazine. But we do maintain that the oil found in extensions and new pay sands is just as good as that discovered in the original few wells. It does not matter whether they are added to the year in which the field was found or if they are credited to the year in which they were actually brought to light. But if the former method of calculating (revision of discovery year figures) is to be used, judgment cannot be passed for several years on the discovery rates of the industry.

Venezuela Prospering . . .

The war has brought this year important changes in rank among the leading oil-producing countries. Most significant has been Venezuela's forging ahead of Russia as runner-up to the United States and relegation of Russia into third place.

In reflection of increased shipments to Great Britain and the United States, Venezuela has been producing at record levels. In September, Venezuela's output averaged approximately 625,000 barrels daily, against 485,000 daily a year previously. That country's present production is about the same as that of California.

Russia was surpassed by Venezuela several months ago. The Russian production of 550,000 barrels daily in September compared with 725,000 daily in September of last year.

California Attains New Importance

Looming Pacific War Would Tax Ability To Supply Oil

Because Hitler set out to establish a New Order in Europe, the importance of California's oil industry has been greatly magnified; and instead of a temporary problem of shipping oil to the East Coast, the oil industry of the United States shortly may face a more basic task of greatly expanding that whole, integrated division of it that operates in the vast area between the Pacific and the Rockies.

That big and intricate is the upheaval which now shakes the earth.

The United States has been brought, through the Hitlerian wars, to the juncture where an American war with Japan appears to be the only alternative to watching Russia collapse into the arms of the Nazis, a folding up that would dwarf in significance the fall of France, by exposing the Pacific as well as the Atlantic to any hazards involved in German power.

Russia can be kept in the war against Germany, not by maximum aid from Britain and the United States, in the opinion of many qualified analysts, but only by an American-Japanese war that would permit Russia to move armies, equipment, and supplies from the East to the German front, with full assurance of not being invaded by Japan.

Culmination of the protracted conflict between the United States and the junior Axis partner in an outright American-Japanese war logically would intensify naval, military, industrial, and commercial activity throughout the Pacific Coast region and impose upon the oil industry of that region unprecedented demands. Much greater production of crude oil would be required, and many new oil fields would have to be discovered to maintain the large production. More refining capacity would be needed, and more pipe lines.

Just as it is impractical to ship California oils eastward beyond the

Rocky Mountains, overland or through the Panama Canal, so it would be impractical for the West Coast to depend on regions east of the Rockies for supplies of oil.

The Pacific Coast region traditionally has been an empire within itself in regard to petroleum, and the importance of its maintaining that position would be greater than ever before in the event of war with Japan.

That Big Line . . .

SPAB's refusal to grant any preference ratings for materials needed to construct a 24-inch crude oil pipe line from Texas to the Atlantic Seaboard was a wise decision, both from the standpoint of the oil industry and the national defense program. Moreover, the decision was based on sound logical thinking.

Certainly the large quantity of steel that would have been required to construct the big line can be used to greater advantage in other defense projects. And from the industry viewpoint, the line is not essential now that Britain has returned a number of the diverted tankers.

In its statement, SPAB showed a good understanding of the industry itself. Its suggestion that shorter and less expensive lines might be found desirable should be encouraging to the industry. With consumption increasing rapidly it is going to be necessary to connect many fields with trunk lines and expand outlet facilities in others, and apparently SPAB is aware of this situation. Apparently the industry can look forward to receiving preference ratings on materials needed to construct such pipe lines. Now that tanker scarcity appears to be a thing of the past, this will be more helpful to the industry than the big line to the East Coast would have been.

SHAKE-OUTS
From The News

The U. S. War Department will construct a plant near Brownsville, Pa., to manufacture TNT from petroleum toluene. The plant will cost several million dollars, and will be government-owned and agent-operated. It will employ approximately 2000 men per day.

»

Helium is still being developed by the government in the Amarillo area of the Panhandle. Two recent completions have further increased the capacities available. Now used to counteract bends of divers, as an additive in anesthetics, etc., in addition to its first purpose of affording non-inflamable lifting power for lighter-than-air craft, its uses have been expanded. The United States enjoys a practical monoply upon this element.

»

October 18 marked the close of the first month in which United States crude oil production was in excess of 4,000,000 barrels per day. During the four weeks ended on that day the daily average output was 4,025,550 barrels.

»

New York City motorists last week had the opportunity to have their automobiles tested free to determine the amount of gasoline wastage. Eighty percent of a designated number of cars passed the test requirement of less than 20 percent wastage. Fifteen city-operated stations, staffed by WPA personnel, and with about 130 service stations cooperating, conducted the tests as part of civilian defense week.

»

About one fourth of the $2,800,000,000 business done by service stations in 1939 was on credit, analysis of a large segment of these sales by the Census of Business reveals. One third of the 242,000 service stations in the United States sell for cash only, and did one fourth of the 1939 business. Two thirds of the stations give credit, with credit sales amounting to one third of their business, or one fourth of the total business of all stations.

Motor trucks on U. S. highways today have a potential haulage capacity at least 40 times as great as those of 1917 when the country entered World War I. The American Petroleum Industries Committee estimates that 5,115,000 trucks were registered in the first eight months of this year, compared with a registration of only 326,000 vehicles during the full year of 1917. The increased number of vehicles is only one of the reasons for the increased hauling capacity of motor transport, however, other important factors being today's better highways, greater speeds and higher capacities of modern units.

»

With plans being pushed to increase output of 100-octane aviation gasoline, military aviators find these fuels promote greater flying efficiency in the way of increased speed and power, reduced weight, and better maneuverability. Effectiveness of Britain's present warplanes is being ascribed in some degree to the increasing availability of American 100-octane gasoline. Fuel in captured German planes appears to be chiefly 90-octane or below.

»

Toluol production, a major bottleneck in World War I, costs considerably less when processed from petroleum, Dr. Gustav Egloff told the American Petroleum Institute in San Francisco. Production from coal costs between 27 and 30 cents a gallon, whereas production cost from petroleum averages well below 25 cents a gallon. In 1918 the price of toluol soared to over $6 a gallon. He suggested production capacity should be expanded 100 percent.

»

The Office of Petroleum Coordination has a payroll force of 171 at this time. This includes those in all field offices, as well as Washington. More than half of these are stenographers, clerks and others necessary in handling the vast incoming mail.

Production . . .

Current industrial production in the United States is about 45 percent greater than that reached in 1929, which was the largest on record prior to inauguration of the defense program. But the country now is very close to its maximum producing capacity, employing its economic resources almost fully; and further increase of production in 1942 is expected to be only about 5 percent.

If that expectation is fulfilled, the petroleum industry likely will show an expansion of production and refining greater than the average for all industry.

Even the more conservative forecasters anticipate an increase of at least 6 or 7 percent in total demand for petroleum in 1942, and they concede that the increase may be as much as 10 or 12 percent.

San Francisco . . .

Oil men of San Francisco set a new high in entertainment for A.P.I. members when the annual meeting was held there week before last.

Operating under the handicap of a hotel strike the entertainment committee had to change its plans more than once at almost the last minute, but despite this handicap the program of entertainment and hospitality was carried out smoothly and with complete success.

A Letter to Mr. Ickes

November 12, 1941

Honorable Harold Ickes
Petroleum Coordinator
Washington, D. C.

My dear Mr. Ickes:

When, in your speech before the American Petroleum Institute in San Francisco, you unequivocably said:

> "I view the office of Petroleum Coordinator as an agency created to do a necessary work during the emergency - an agency that will be discontinued when the emergency ends"

you gave the oil industry an assurance which was badly needed to establish the relationship necessary to the successful coordination of petroleum effort in national defense. And when you said, in addition to the foregoing, that "So far as I know, the government does not want to control the oil business," we who heard you assumed that you were making a sincere bid for the kind of cooperation which cannot exist in an atmosphere of distrust.

Without going into the reasons for the fears which the writer has shared with many oil men on the matter of federal control of the oil industry - fears which we have frankly expressed in the columns of The OIL WEEKLY, I wish to say that I for one, Mr. Ickes, am going to take you at your word, and with the feeling that friendly suggestions will be appreciated by you, offer some suggestions which I believe are pertinent and practical. And as a publication which has served the oil industry faithfully and honorably for more than a quarter of a century, The OIL WEEKLY, of which I am publisher, shall pledge to you that ultimate degree of cooperation which we have desired to give every governmental agency working honestly and intelligently for the defense and welfare of our country.

There is no doubt in my mind that you and I have one thing in common as American citizens, and as men whose duties closely identify us with the oil industry: we are in deadly earnest in desiring that the highly important oil industry make its fullest and most effective contribution toward destroying what you termed "Hitlerism" in your address before the A.P.I. Nor am I, and a host like me in the oil industry, unappreciative of the need of coordination on the part of all factors in the oil industry, if this job is to be done right.

It is my hope that you also are in agreement with me in the thought that the industry's duties involve taking care of civilian as well as actual armament needs. We both know that the automobile in the United States has come to occupy such an important part in the business transportation life, as well as the personal life of the average American

worker, that unnecessary restriction of such usage is bound to affect adversely both the efficiency and morale of the workman.

We all know, of course, that civilian needs can be curtailed, if the emergency demands it, but we both know how difficult it will be to do such curtailment fairly - to separate the purely unnecessary pleasure driving from that usage which helps to sustain morale.

All of which gets us down to some suggestions meant in the friendliest manner.

Don't you think that it is time to get the answers to several questions and then coordinate the efforts of all in doing the things necessary?

Isn't it high time to find out just how much additional oil can be produced without adversely affecting ultimate recovery, simply by "opening the valves"? Isn't it time to find out where this oil can be produced?

Then, isn't it time to present the industry with some concrete figures as to what will be expected of it in the way of daily production of crude oil - and to find out how much drilling will be necessary to do this and to place the crude reserves at a desirable figure? That will mean setting a goal for reserves, of course.

Then, when the amount of necessary drilling has been calculated, isn't it time to get busy in a big way and see to it that the industry has the necessary supplies with which to do the job?

Isn't it time to determine whether or not the crude stocks of the country are at their proper level - at their proper level at the proper points? Such stocks may be adequate - I do not think that they are, but if they are too low, the industry should have a suggestion from the coordinator as to what they should be.

If there is physical waste in the oil industry which can be cured during this emergency, why not tell the industry specifically where such waste is occurring?

No doubt many, probably all, of these suggestions have been receiving consideration at the hands of the Office of Petroleum Coordination, but the industry has had no suggested program of coordination offered it along these specific lines. Mr. Davies, in an able speech, it is true, gave the industry an idea as to what may be required of it - but it hasn't had an assignment.

In your San Francisco speech you indicated that you had come to have a better appreciation of oil men after getting better acquainted with them. It is my belief that you are not yet fully aware of the powerful force which can be set in motion within the industry. With no intent to flatter the oil industry, it can be truthfully said that when the industry starts working toward a goal it puts into effect not only a great mental force, but a tremendous physical force as well. It proved this in the other world war, and it will be found meeting the challenge faithfully - if it is told definitely what the challenge is and no obstructions are put in the way of its forces.

Yours for the results which will help to guarantee victory over the enemies of democracy.

Sincerely,

R. L. Dudley

RLD:pf

Publisher
The OIL WEEKLY

Washington Roundup

Administrator turns thumbs down on Texas crude price increase . . . But in other quarters it was indicated some price adjustments will be made Allocation of steel to Oil Industry under direction of oil coordinator

By B. F. LINZ, Washington Correspondent

REFUSAL of Price Administrator Leon Henderson to countenance an increase in the posted price of North Texas crude marked an otherwise quiet week on the Washington oil front.

Henderson told the industry it could not increase prices first and get OPA approval afterward, but would have to come to Washington before it took such steps. He indicated nothing further would be said on the subject until his organization has completed its study of Mid-Continent costs, undertaken when Phillips Petroleum Company proposed a 25-cent increase last July.

But in other quarters there were indications that the oil industry might be permitted to up its prices in the near future. OPA experts were learned to be engaged in projecting the trend of prices over the next four months; in every instance, it is said, the trend has been found to be upward. On the basis of these reports, the price administration is expected to adopt a policy of permitting some gradual increases to industries whose costs are definitely shown to be on the up-grade, oil assertedly among them.

With Oil Coordinator Ickes engaged in whipping up an organization as Coordinator of Solid Fuels, a new job imposed upon him by the President, and with Deputy Coordinator Davies absent from the city until the end of the week, OPC produced nothing startling, but there were some developments of interest in other branches of the defense set-up.

The Maritime Commission announced contracts for the construction of 15 reinforced-concrete barges, originally proposed as a possible solution of the tanker shortage; the Senate committee which investigated the East Coast shortage sought to extend its authority to make a study of solid fuels, and more detailed information on OPM's new system of allocating scarce materials direct to major industries instead of issuing priorities developed that so far as the oil industry is concerned, the allocations will be controlled by the coordinator's office.

Thumbs Down

Turning thumbs down on a seven-cent increase in the prices of North Texas crude posted by several companies November 6, Leon Henderson, chief of the Office of Price Administration, told the industry flatly on November 11 that it cannot increase prices first and ask for government approval afterwards.

Result of a lengthy meeting between Henderson and his aides and representatives of Consolidated Oil Corporation and The Texas Company, which initiated the increase, was that the raise was abandoned.

Henderson pointed out that the North Texas incident was the first in which crude prices were changed since October 10, when the OPA asked that quotations be maintained without change pending completion of studies of the Mid-Continent price situation.

"Prices cannot be advanced first and discussed afterward," he said. "We are studying the whole crude-price situation in the Mid-Continent area and this study will be pressed forward rapidly. It will include specific consideration of whether the customary price differential on North and North Central Texas crudes, which is of nine years' standing, is still justified. This applies to differentials in other areas as well. In the meantime prices, which are generous compared with those obtaining until recently, should remain stable."

So far as the need for the seven-cent increase is concerned, Henderson said, it was an increase and not an "adjustment" as contended by the companies. The price for a substantial volume of production was seven cents higher than before the increase, he pointed out, and, he added, "any difference in nomenclature is irrelevant."

Allocations

Application to the oil industry of the new system of allocating to the various industries the amounts of strategic materials which they may use, adopted last week by the Office of Production Management and Supply Priorities and Allocations Board, will be handled through the office of the petroleum coordinator.

Under the new system, OPM in cooperation with the industries, will ascertain how much of the various materials each industry needs and, in cooperation with SPAB, will allocate to each that proportion of its needs sufficient to enable the filling of essential orders.

In the case of the oil industry, the allocation for steel will be turned over to the coordinator, who then will designate where it shall go and how it shall be used.

The industry, normally the second largest consumer of steel (following transportation, including railroads and automobiles) is, under present emergency conditions, the fourth largest user, being outranked by construction, transportation and machinery.

For 1942 operations, it is estimated by the coordinator's office, the industry will require 5,846,000 tons of steel to meet the demands of the defense program. This includes 3,175,000 tons for the production branch, on the basis of more than 30,000 wells; 1,843,000 tons for transportation—pipe lines, tank cars, tank trucks, etc.; 647,000 tons for refining, including aviation gasoline facilities, and 181,000 tons for marketing.

Included in the 3,175,000 tons for the production branch is 1,817,000 tons of tubular goods, of which the industry is the nation's biggest user, and also probably the largest

permanent user of steel by reason of the fact that much of the casing is necessarily cemented in the ground and is thereafter irrecoverable.

Regulations of the OPM with respect to priorities for repair, maintenance and operating supplies, were amended November 10 to bring natural gas, and hydrocarbons associated with petroleum, under the terms of the preference rating order, and extended it to the transportation as well as the production of those items.

OPM officials explained that this means that pipe lines, railroads and truck fleets engaged in moving the products of the petroleum industry may now apply the A-10 rating to the acquisition of the necessary repair and maintenance parts and operating supplies.

Another amendment extends the priorities to those using tools or equipment to repair or maintain the property of other producers, thus extending priority assistance to independent contractors and others, such as machine and repair shops.

At the same time, OPM eliminated its previous restriction against the replacement of existing equipment by improved equipment and prohibiting replacements unless the existing installation is beyond repair. It was explained that it has been found impossible, and in many cases undesirable, to require replacement with equipment exactly like the old, since this frequently held the producer to the use of antiquated equipment, and sometimes made it impossible for him to obtain any replacement equipment at all.

Preference Ratings

Charging that certain suppliers have made misleading statements to their customers regarding the operation of Preference Rating Order P-22, issued by OPM to facilitate the securing of repair and maintenance material, "in an effort to induce their customers to use the rating in obtaining materials," the legal division of OPC on November 12 issued an explanatory statement on the purpose and use of the priorities accorded by the order.

The actual user of the equipment ordered under P-22 is the only person entitled to initiate the A-10 rating which is provided, it was pointed out, and, the division warned, "it follows therefore that such person will be the one held primarily liable for any misuse of the order."

"To operators in the industry," it was explained, "this means that they must be extremely careful to see that they comply in every respect with the provisions of P-22 before endorsing the certification which permits them to apply the A-10 rating.

"It should be emphasized that in applying the A-10 rating, it is the purpose for which equipment is to be used, not the equipment itself, which is determinative of the right of any operator to apply the A-10 rating. Thus, although many types of equipment can be obtained under P-22, only such equipment can properly be obtained under the order as is to be used for 'maintenance,' 'repair,' and 'operating supplies' as defined therein. Any use of the order to obtain equipment for other purposes is a violation of the policy behind the order, as well as a violation of the specific provisions incorporated therein.

"It is important that operators should note in this connection that any person who applies an A-10 rating assigned by the order in wilful violation of the terms and provisions of the order, or who wilfully falsifies any records required to be kept by the order, or who obtains delivery of material by means of a material and wilful misstatement may be forbidden to apply further the A-10 rating. In addition, such an operator may be prohibited from obtaining further deliveries of material under allocation, and may be deprived of any further priority assistance. The Director of Priorities is also given power to take any other action deemed appropriate in the circumstances of the case, including the making of a recommendation for prosecution under Section 35A of the Criminal Code (18 U.S.C. 80)."

In determining the proper purposes for which materials may be obtained, it was explained, "operating supplies" means only material which is essential to the operation of a user's business and which is consumed in the course of such business.

"Thus," the division declared, "contrary to the impression created by certain suppliers in circular letters sent to the trade, desks, file cabinets, typewriters, and other office accessories ordinarily thought of as a capital outlay cannot be obtained under the A-10 rating assigned by Preference Rating Order P-22, unless specifically within the 'maintenance' or 'repair' provisions.

"It should also be noted that 'operating supplies' do not include material which is to be physically incorporated in whole or in part into any product of the user, or into any material which the user distributes to or stores, transports, or services for another person. The terms 'maintenance,' 'repair,' and 'operating supplies' do not include material which is to be used for additions to, or expansion of, a user's property or equipment, nor do these terms include any material which is of a type not previously carried on a user's book under 'maintenance,' 'repairs,' 'operating supplies,' or the equivalent."

Investigation

Broadening of the authority of the special Senate committee which recently investigated the East Coast oil shortage, to include a study of the situation with respect to solid fuels was asked of the Senate, November 10, by Senator Francis Maloney of Connecticut, chairman of the group.

Further extension of the investigation to take in power also was immediately sought by Senator McKellar of Tennessee, one of the Southeastern States in which compulsory curtailment of the use of electricity is threatened.

Maloney submitted his request immediately following the disclosure that President Roosevelt had made Coordinator Ickes responsible for solid fuels as well as oil. There is at present no need for a further investigation of the oil situation, the senator said, but the committee should "be prepared for any fuel emergency."

"In connection with the possible danger of a further oil shortage," he told the Senate, "I am sure that careful plans will be made to meet any later emergency.

"New tankers are now being rapidly completed, and the tanker fleet under American jurisdiction is growing fast. This encouraging condition, with the chance for the organization of tank-truck carrying facilities, and the other facilities which could be made available, would enable us to ward off the dangers which might come with the intensity of the wars abroad."

Hearings on the production of petroleum and natural gas on the public lands, which have already been held in Denver, will shortly be moved to Washington, it was

disclosed by Senator Joseph C. O'Mahoney of Wyoming, chairman of a Public Lands subcommittee in charge of the inquiry. Because of the fact that the Maloney investigation goes further than that authorized by his committee, O'Mahoney suggested, the former should be extended so as to make sure that the question of production on the public lands is included in any survey which may be made of the general situation.

Tender Board

Activities of the Federal Tender Board were stretched beyond the confines of Texas this week, the Petroleum Conservation Division on November 12 announcing the establishment of a branch at Wichita, Kansas, for assistance to the state authorities in enforcing conservation legislation.

The office will be under the charge of Charles J. Eastman, former director of the Federal Petroleum Agency at Kilgore, Texas, who has been engaged in investigations in Kansas to determine whether oil has been produced in violation of the proration laws and thereafter shipped in interstate commerce.

Pipe Line

Application for priority rating for some 85,000 tons of steel needed for the construction of its proposed Wichita Falls, Texas-Savannah, Georgia, crude line has been filed with the Supply Priorities and Allocations Board by Trans-American Pipeline Corporation.

The application was submitted following a tacit invitation by SPAB in its decision refusing priorities to the projected Texas-New York line, in which it said consideration would be given to proposals for the construction of short, inexpensive pipe lines to link sources of supply with markets.

The announced plans of TAPCO call for a 10¾-inch line from Wichita Falls to the east Texas line, and a 12¾-inch line to Savannah, the 1050 miles of pipe being estimated to cost $12,637,000. Also required would be six 1200- horsepower pumping stations and 20 2400 - horsepower stations. Construction of underground storage for 3,000,000 barrels at Savannah would cost $1,500,000.

Company officials claim the project has been found by the coordinator's office to have merit, although OPC has not yet taken any formal action, and that the Navy Department has evinced interest, particularly if the line were extended to Charleston, South Carolina, where there is a naval base.

The proposed line has been given the consideration of the Navy Department, and in a departmental report to the office of the Secretary it was held that the Texas-Georgia project was desirable although, it was added, "this line does not deliver the oil where it would be most convenient so far as the Navy is concerned."

However, it was commented, factors in favor of the line are the short time — six months — which would be required for its construction, the comparatively small amount of steel which would be required and the fact that it would be a common carrier.

"The oil coordinator is possibly not in favor of the line because it does offer an inducement to small independent oil companies to develop these reserves," the report suggested in referring to the fact that it would traverse the territory in which is located 22 percent of the country's reserves.

"Provided either OPM or the oil coordinator asks for our opinion on this matter," the author of the report concluded, "I would, personally, be in favor of approving the project," assuming that all the information submitted presents a "fair picture." "However, as a matter of policy the Chief of Naval Operations does not recommend approval of any commercial project which does not directly affect the Navy."

Barges

Construction of 15 concrete barges, designed to carry oil or other bulk cargo, was authorized by the Maritime Commission November 10 in contracts for five barges each to the Port Newark Shipbuilding Corporation, Newark, New Jersey; San Jacinto Shipbuilders, Inc., Houston, and Allied Engineering & Shipbuilding Corporation and Tavares Construction Company, Los Angeles.

Construction of the necessary facilities and of the barges themselves will entail an outlay of approximately $9,000,000.

The ships will be approximately 350 feet in length with a beam of 54 feet and, no motive power being provided, are designed to be towed.

The suggestion of concrete barges was made during the period of the East Coast oil shortage, when efforts were directed toward expansion of various methods of transportation other than tanker.

Although they are to be reinforced with steel, they will not use any of the limited supply of shipbuilding steel. When the Maritime Commission first went into the question of barges, it was argued that the use of concrete would afford a way of increasing tonnage without the use of steel.

Whether any great production of barges will be undertaken will be determined by the results of the current trial orders. Originally, it was planned to build about 100 of the bottoms.

Tank Cars

East Coast receipts by rail, at a peak when Ickes announced the end of the shortage, continued to decline during the week ended November 8, dropping below 4000 cars to a total of 3932 cars, OPC reported November 13.

The daily average movement was 562 cars, compared with 582 cars in the preceding week, with deliveries estimated at 126,450 barrels a day compared with 131,400 barrels.

Shipments by companies for the week ended November 8, as reported to the coordinator's office, were as follows: The Atlantic Refining Company, 402 cars; Cities Service Oil Company, 208; Gulf Oil Corporation, 183; Pan American Petroleum Transport Company, 407; The Pure Oil Company, 70; Shell Oil Company, 288; Sinclair Refining Company, 566; Socony-Vacuum Oil Company, 187; Standard Oil Company of Kentucky, 62; Standard Oil Company of New Jersey, 1193; Sun Oil Company, 8; The Texas Company, 201, and Tide Water Associated Oil Company, 167.

Ickes Says

The East Coast now is "in a very comfortable position" with respect to tankers.

There are no indications that further tankers are to be returned this year; but neither are there any indications that the British will require more ships from the United States than they now have.

"If the British need any more tankers and can make a proper showing, we will find them tankers," and any application will receive "sympathetic" consideration. There was no time limit for such requests, in the agreement to return the 40 bottoms."

"I don't think there will be any

difficulty" in financing new refineries for the production of 100-octane aviation gasoline. Deputy Davies has had one or two discussions of the subject with RFC Administrator Jesse Jones and "everything is moving along satisfactorily."

The tetra-ethyl lead situation continues serious. There is a shortage and the situation is "not any too happy." There is some demand from abroad which does not help the situation, and OPM has the matter under study and may issue a statement in the near future.

An investigation of the oil situation in Latin America is being made for OPC by Ruth Sheldon Knowles, writer on oil subjects.

Stocks

East Coast inventories declined by 98,000 barrels during the first week of November, according to the weekly report of OPC.

Total stocks, however, were 3,304,000 barrels above those of a year ago and totaled 65,409,000 barrels on November 8, of which 12,790,000 barrels was crude, a drop of 762,000 barrels from last year; 19,334,000 barrels gasoline, an increase of 615,000 barrels; 22,042,000 barrels light heating oils, an increase of 4,787,000 barrels, and 11,243,000 barrels heavy fuel oil; decline of 1,336,000 barrels.

As compared with November 1 inventories, crude stocks were down 264,000 barrels and heavy fuel oil 471,000 barrels, while gasoline and light heating oils showed increases of 114,000 and 524,000 barrels, respectively, the coordinator's office reported.

Demand

Demand for fuel oil this year will approximate 600,000,000 barrels, an increase of about 11 percent over the record-breaking 1940 demand of 534,007,000 barrels, it is indicated by figures compiled by the Bureau of Mines.

The rapid expansion in the demand for heating oils which rose from 76,953,000 barrels in 1935 to 160,379,000 barrels in 1940, brought total sales of fuel oil last year to 498,758,000 barrels, 9 percent above the 1939 total of 456,943,000 barrels, the bureau reported.

In addition, exports and shipments of 35,249,000 barrels were reported, although this was a marked decline from the 49,505,000 barrels of 1939.

Total kerosene demand this year is expected to reach 74,000,000 barrels, a further increase over the 1940 record of 71,036,000 barrels.

Domestic consumption of fuel oil increased with all classes of users except for ships' bunkers, for which the demand in 1940 dropped approximately 4,451,000 barrels. The greatest increase was in heating oils, which jumped 24,147,000 barrels.

Discussing the probable 1941 demand, the bureau pointed out that the tanker situation played a prominent part in dictating the trend of consumption during the third quarter, with heavy movement toward stock piles, while the warm weather of September and October lessened the use of heating oils and will probably keep the year's total from reaching the point anticipated several months ago.

"Present calculations indicate 1941 requirements at approximately 179,000,000 barrels, 11 percent above the 1940 total," the bureau stated. "Exports of distillate fuel oil declined about 30 percent in the first eight months of 1941 compared with the same period of 1940. There may be some improvement in this overseas trade toward the end of the year, but it is thought that the total for 1941 will not exceed 16,000,000 barrels.

"The demand for residual fuel oil, responding to the rise in industrial activities in connection with national defense, showed a 6 percent increase in the first quarter of 1941 and a 15 percent increase in the second quarter over corresponding periods of 1940. The July and August, 1941, totals indicate a further rise in market requirements for heavy-fuel oil and it is believed that the brisk demand will continue and that deliveries for the year will be approximately 390,000,000 barrels—a 15 percent gain over 1939 requirements. Available statistics through August, 1941, show a 15 percent decline in exports of residual fuel oils and it is presumed that about this rate of loss will hold for the remainder of the year, indicating that the total exports of heavy fuel oil for 1941 will not be over 14,000,000 barrels."

Domestic kerosine requirements during the first eight months of this year remained at the 1940 level, the bureau said. Some improvement was anticipated, however, with the opening of the heating season, and the 1941 demand was forecast at about 72,000,000 barrels.

However, the bureau added, "the export market for kerosine dropped unbelievably low during the first eight months of 1941 and no improvement can be foreseen at this time. The presumption is that the 1941 exports will exceed 2,000,000 barrels, a quantity less than the 1940 total, which was an all-time low in this trade."

Analysis of the 1940 fuel-oil consumption showed that the Army, Navy and Coast Guard took 17,183,000 barrels, compared with 12,472,000 barrels in 1939.

Foreign Trade

Exports of crude oil increased from 228,000 barrels valued at $363,000 in August to 848,000 barrels valued at $1,140,000 in September, but in the latter month were but one fifth of the 4,260,000 barrels valued at $5,490,000 shipped from the United States in September, 1940, according to figures compiled by the Department of Commerce.

Exports of motor fuel and gasoline, however, hit the highest figure for many months in September, when 11,058,000 barrels valued at $7,680,000 (including anti-knock compounds), was reported, compared with 1,173,000 barrels valued at $5,112,000 in August and 1,673,000 barrels valued at $5,651,000 in September of last year.

Shipments of gas and fuel oil also increased, from 2,066,000 barrels valued at $2,567,000 in August to 2,175,000 barrels valued at $2,783,000 in September, where they were well above the September, 1940, export of 1,871,000 barrels valued at $1,934,000.

For the first three quarters, exports of crude totaled 19,281,000 barrels valued at $26,780,000 against 40,348,000 barrels valued at $53,116,000 in 1940; motor fuel and gasoline, 20,654,000 barrels valued at $40,009,000 against 15,371,000 barrels valued at $54,727,000; and gas and fuel oil 16,659,000 barrels valued at $18,926,000 against 23,830,000 barrels valued at $27,954,000.

Imports of crude also increased in September, from 4,319,000 barrels valued at $3,647,000 to 4,790,000 barrels valued at $4,400,000, bringing the total for the first nine months of the year to 36,484,000 barrels valued at $29,564,000. In the corresponding period of 1940, imports were 30,408,000 barrels valued at $22,743,000.

September imports of gas oil and fuel oil ran high at $3,302,000, compared with $1,922,000 in August and $1,680,000 in September, 1940, and for the nine months reached $19,680,000 compared with $19,591,000 last year, the department announced.

Fluorescence Analysis of Drill Core Has Wide Possibilities

By JACK DE MENT

By merely placing a portion of the drill core under the radiation and noting the fluorescence that is evoked, it is often possible to identify specific minerals present which might otherwise be overlooked

A LITTLE-KNOWN and most promising technique for the examination of drill cores is by use of ultraviolet light. By merely placing a portion of the drill core under this radiation and noting the fluorescence that is evoked it is often possible to identify specific minerals which may be present and otherwise overlooked. Strategic metals, petroleum, and a wide variety of mineral species may be detected by their fluorescence. By subjecting portions of a drill core to laboratory analysis with ultraviolet light or by using a portable ultraviolet light unit at night this analysis is facilitated.

National defense may be aided considerably by this quick and certain method which allows simultaneous determination of a number of minerals. Small costs are involved since little training is required in use of the technique and the apparatus required consists of an ultraviolet light source and a proper filter, a number of such units being available on the market.

A highly successful method for prospecting scheelite and other tungsten ores is by use of ultraviolet light. Recently one of the most important discoveries yet made in Idaho was by inspection of drill cores. An antimony deposit near Stibinite, Idaho, was being prospected by drilling. Examination of the drill cores, taken from depths showed the unexpected presence of calcium tungstate, scheelite. Moreover, according to the amount of tungsten revealed by fluorescence the Idaho deposits holds promise of becoming important.

Although only points of general interest can be alluded to in this paper, the reader may obtain an idea as to the possibilities of the method of prospecting by inspection of drill cores under ultraviolet light and noting their fluorescence. The idea of pumping the water-soluble minerals from the ground, should their value warrant such processing, also presents some interesting possibilities. For additional information on the methods of fluorescence analysis and the multitude of applications the reader is referred to the works listed in the bibliography at the end of this paper.

While many minerals fluoresce characteristically under ultraviolet light of a specified wave length, many minerals vary considerably in their luminescent response. Petroleum most always fluoresces a characteristic blue or shade of blue. But some of the zinc minerals may vary in their fluorescence. Uranium on the other hand is practically always characterized by a yellow-green response. Mercury can be detected if special methods are used to expel it from its ore. The fluorescence method for prospecting and detecting mercury is one of the most sensitive physical tests available for any element and rivals some of the delicate tests used in microchemistry. By the fluorescence method the mercury which is caused to evaporate by the heat of the hand may be observed with little difficulty.

A wide variety of ultraviolet lamps are available and these are of varying value for fluorescence purposes. While the spectral characteristics of an ultraviolet unit are a function of the filter, rather than the lamp itself, the source of radiation is a significant consideration. The familiar "black bulb" may be obtained for a few dollars and is a fairly good source of long-wave-length ultraviolet light. This unit merely consists of a photo-flood lamp enveloped by a heat-resisting glass filter which allows near-ultraviolet and residual violet light to pass but prevents transmission of longer visible light. Long-wave-length radiation generally implies the use of wave lengths at or about the 3650 A.U. line emitted by incandescing mercury vapor. This line has been adopted tentatively as a standard of long-wave-length ultraviolet light and is of most utility for fluorescence studies requiring this sort of radiation.

A number of excellent short-wave-length ultraviolet units are available. The term short-wave-length light implies the use of rays at or about the 2537 A.U. mercury resonance line. Like the long line at 3650 A.U. this short line has been conveniently and tentatively adopted as a standard. Fused quartz which contains mercury vapor and inert gases at low pressures are known as "cold quartz tubes." These are of the best all-

around value as a source of short-wave-length light.

Tungsten

Three ores of tungsten are strongly and characteristically fluorescent. However, the absence of fluorescence does not necessarily imply a corresponding absence of tungsten since several ores of this element do not fluoresce. Scheelite, calcium tungstate, fluoresces a strong medium-blue color which is nearly unmistakable after once being noted. The fluorescence of scheelite is excited only by short-wave-length ultraviolet light and a negative result will be obtained on even the richest specimens if long-wave-length light is used. Tungsten has recently assumed much importance as one of the strategic metals and scheelite is one of the most valuable tungsten sources. The scheelite usually is dispersed throughout a matrix in the form of fine granules or as small particles. However, scheelite may occur in single crystals which may measure as much as one centimeter along their *a* axis. Although scheelite almost always fluoresces a blue color there have been cases where specimens which were supposedly calcium tungstate failed to have a marked fluorescence. Samples of this mineral from Colorado and Nevada have been reported as not fluorescing. Phosphorescence has not been noted in scheelite.

When some of the calcium tungstate is replaced by calcium molybdate a new mineral species known as powellite is formed. Powellite is also strongly fluorescent but its color differs considerably from the blue of scheelite. Under short-wave-length ultraviolet rays powellite fluoresces a distinct and strong yellowish-white color.

The third tungsten mineral which is fluorescent is cuproscheelite. Specimens of high-grade cuproscheelite have been studied by H. C. Dake.[1] Cuproscheelite fluoresces only under short-wave-length radiation as do both scheelite and powellite. Cuproscheelite emits in the yellowish regions with a slight amount of white being admixed. This yellowish-white fluorescence of cuproscheelite is a great deal like the yellowish-white color noted in powellite and known specimens should be compared in the laboratory in order to note their difference. While specimens of scheelite have often been reported as fluorescing yellowish this is probably due to the presence of small quantities of cuproscheelite and/or powellite.

There appears to be some confusion regarding the fluorescent properties of scheelite, powellite, and cuproscheelite discussed above. The fluorescence method of analysis of tungsten ores has been studied extensively and its results have been closely compared with chemical analysis of the same specimen. Hence, considerable reliance is being placed on the use of ultraviolet light in prospecting, mining, and milling tungsten-containing ores. It is to be noted, however, that the strong blue fluorescence of petroleum and its derivatives may quench or mask the fluorescence of scheelite, cuproscheelite, and powellite.

Petroleum

The fluorescence of petroleum is practically always characteristic and is exemplified by the strong medium-blue emission observed in lubricating oils, petrolatum, and many of the higher hydrocarbons which may be obtained in the laboratory for study. Drill cores containing petroleum fluoresce an intense blue color when excited by ultraviolet radiation of wave lengths between 2000 and 3800 A.U. Generally, the longer ultraviolet wave lengths evoke the best response in petroleum. Fluorescence can be used for correlating oil sands, the technique first being described in detail by John Melhase, according to a recent paper by the writer in THE OIL WEEKLY.[2]

Oftentimes, petroleum oils and various petroleum derivatives fluoresce a strong yellow, green, or blue-green, in addition to the most frequently observed blue color. Refined products such as kerosene, paraffin, and proprietaries with a petrolatum base all fluoresce strongly and characteristically.

Substances which are naturally present in petroleum, such as naphthalene, anthracene, or others present a characteristic fluorescence. However, this is usually masked by the blue luminescence although in processing certain fractions may be tested rapidly for anthracene, for example, by fluorescence. Anthracene fluoresces a strong yellow-green, a color which is evoked by both short- and long-wave-length ultraviolet light from the solid substance and also from anthracene dissolved in organic solvents.

Zinc

Willemite is a naturally occurring phosphor whose base is zinc orthosilicate. The willemite deposits of Franklin, New Jersey, are among the most famous for their fluorescent species. The willemite at Fanklin Furnace is mined extensively for its metal content and the mineral occurs in several colors, such as white, green, red-brown, and pink. Granular, fibrous, and massive forms of the mineral are more frequently found than crystals. The Fanklin deposit has been known since 1650 and has been actively mined since 1861, a total production exceeding thousands of tons.

Almost all varieties of willemite show a characteristic green luminescence. However, some varieties are known which vary from this color, a whitish tinge sometmes being observed. The slightly manganiferous willemites fluoresce the strongest and also phosphoresce. short-wave-length ultraviolet light. is required to excite fluorescence in willemite.

As with many of the other fluorescent minerals many species may also occur with the same element in their make-up but lacking fluorescence. Thus, the failure to fluoresce should not be taken as a criterion that zinc minerals are not present although the characteristic green of willemite is an excellent indication that zinc is present as the orthoslicate.

Hydrozincite often coats the zinc ores of the mines of Utah and Nevada. This basic zinc carbonate fluoresces a strong pale blue under short-wave-length ultraviolet light. Another zinc-containing mineral is sphalerite, the granular black-colored mineral from Tsumeb, South Africa. This substance fluoresces a strong orange under both short and long radiations although its response is best evoked by long-wave-length light. Some of the sphalerite which comes from Franklin Furnace, New Jersey, fluoresces with this orange color and is also strongly phosphorescent. Utah mines produce luminescent sphalerite.

Uranium

Uranium-bearing minerals have recently assumed a unique, and almost fantastic importance with the recent developments in fission and nuclear physics. Fortunately, from this standpoint as well as others, the majority of uranium

compounds are strongly fluorescent. Uranium minerals which are fluorescent almost always fluoresce in the yellow-green regions of the spectrum, at least few specimens have been observed to fluoresce in the red regions and only one or two species fluoresce violet or blue. The luminescent uranium minerals may be classified into strongly fluorescent, weakly fluorescent, and practically non-fluorescent, according to their appearance under short- and/or long-wave-length ultraviolet radiation. The fluorescence aspects of the uranium minerals and the artificially prepared compounds have been discussed in considerable detail by H. C. Dake and the writer.[2,3,4,5]

The markedly fluorescent uranium minerals are the phosphates, arsenates, and sulfates, all of which emit a characteristic yellow-green color. The uranium carbonates and naturally occurring double salts fluoresce an intense green color. The uranium micas and silicates generally do not fluoresce as the foregoing species although an occasional violet or lavender fluorescence may be observed, e.g., gummite. Some of the fluorescent uranium minerals are given in the following table.

Fluorescent Uranium Minerals

Species	Fluorescene
Autunite	Yellow-green
Chalcolite	Yellow-green
Johannite	Yellow-green
Dakeite	Green
Torberite	Yellow-green
Uranocircite	Yellow-green
Uranophane	Yellow-green
Uranospathite	Yellow-green
Uranospinite	Yellow-green
Uranothallite	Green

Uranium minerals such as metatorbernite, however, fluoresce a strong yellow-blue color which is unmistakable once observed. Rocks and other substances which contain traces of uranium will also fluoresce a strong yellow-green color or with a slight variation of this. Hyalite opal, agate, chalcedony, and other species of silicon dioxide which contain small amounts of uranium minerals may fluoresce with the yellow-green color.

However, as with the tungsten minerals a lack of the fluorescent color does not imply that the mineral is absent. The oxides of uranium, and several other compounds do not fluoresce. Pitchblende and uraninite do not fluoresce but may be altered to secondary minerals which generally are luminescent. However, the presence of fluorescent secondary uranium minerals may also mean that larger quantities of primary minerals such as pitchblende or carnotite will be found in the vicinity or are associated with the fluorescent variety.

Fluorescent Minerals

[SW≡fluorescent response under short-wave-length ultraviolet rays]
[LW≡fluorescent response under long-wave-length ultraviolet rays]

Mineral	Fluorescene
Agate (U containing)	Variable green [SW]
Aragonite	Variable red [SW]
Autunite	Yellow-green [SW-LW]
Barite	Yellowish [LW]
Calcite	Variable red [SW] May be green also [SW]
Calcium-larsenite	Vivid yellow [SW]
Clinohedrite	Bright orange [SW] Pink [LW]
Colemanite	Variable—green [LW]
Curtisite	Yellow-green [SW-LW]
Fluorite	Variable [SW-LW]
Gypsum	Usually green [LW]
Hackmanite	Orange-yellow [SW]
Halite	Usually red [SW]
Hydrozincite	Strong blue [SW]
Pectolite	Yellowish [SW]
Powellite	Yellowish-white [SW]
Selenite	Variable-blue [SW]
Sphalerite	Usually orange [LW]
Wernerite	Vivid yellow [SW-LW]
Wollastonite	Yellow-orange [SW]
Zippeite	Yellow-green [SW]

Mercury

The test for mercury in drill cores involves some refinement in technique although at most this is simple. The test for mercury is a certain one and depends on the opacity of mercury vapor to ultraviolet light. The test is exceedingly sensitive and rivals those used in microchemistry for this element. In testing for mercury the specimen is heated with a torch to a temperature of several hundred degrees, i.e., sufficient to cause volatization of the mercury, and placed between a short-wavelength ultraviolet lamp and a screen of willemite or other fluorescent material. If mercury is being expelled from the sample copious fumes will be noted as black shadows on the screen, a remarkable and striking method for detecting this element. The test must be conducted in a darkened room and experience should be obtained beforehand by the operator by practice on samples known to contain mercury or on the pure metal itself.

A screen for mercury dectection may be constructed by coating a sheet of cardboard with powdered willemite or other strongly fluorescent mineral. The commercial phosphors such as zinc orthosilicate or calcium tungstate provide very effective screens. Short wave lengths are to be used in all of the tests for mercury. At room temperatures a beaker of mercury will be observed to be continually giving off fumes and these increase noticeably when the vessel is warmed by the hand.

Specific Minerals

Many specific minerals fluoresce characteristically under ultraviolet light and this property may lead to their detection, identification, or aid in mining. Knowledge about the composition and presence of certain mineral species in drill cores may aid the petroleum geologist to draw definite conclusions about the strata in which he is working. Some interesting possibilities are presented by the possible correlations between fluorescence properties of drill cores and the nature of the well and its future capabilities.

In the following table many of the more well known fluorescent minerals are given. It will be noted that the fluorescence varies according to the wave length of ultraviolet light used and the color of fluorescence may also vary according to the locality from which the substance was obtained. More definite information about the fluorescence of minerals may be obtained from the literature cited in the bibliography.

It must be remembered also that many strongly fluorescent minerals mask the fluorescence of minerals which do not emit such brilliant light and which may also be present in the same core. Specific gravity, agitation, or other physical methods of separation will immediately reveal when this occurs. Chemical methods of segregation are not to be preferred because of the alteration in structure produced, this affecting the fluorescence properties.

LITERATURE CITED

[1] Dake, H. C. and De Ment, J., "Fluorescent Light and Its Applications," New York: Chemical Publishing Company (1941).
[2] De Ment, J., THE OIL WEEKLY, **101**, [2] (1941).
[3] ——— and Dake, H. C., "Uranium and Atomic Power," New York: Chemical Publishing Company (1941) [in press].
[4] ———, *The Mineralogist*, **8**, 11447 (1940).
[5] ———, *Ibid.*, **8**, 10,392 (1940).

The Amount and Measurement of Internal Corrosion in Gasoline Pipe Lines

By J. M. PEARSON, Susquehanna Pipe Line Company

DIFFICULTIES in obtaining an accurate idea of the amount of internal corrosion in a gasoline line are discussed in connection with the available data.

The results of measurements of debris removed, of measurements of the pipe wall, and of corrosion suffered by test coupons are compared. The rates of corrosion determined so far vary from less than 0.1 up to 2 percent of the pipe weight per year, depending upon location relative to gasoline storage used as the source, and upon other factors such as throughput, use of scrapers, etc.

A method of measuring the weight loss of a test joint of pipe in a continuously operating line is described. The relation between weight per unit length, temperature, and electrical conductivity is used to determine the pipe weight at any desired time by means of electrical measurements. Application of the method will serve to determine distributions of corrosion; it will serve also as a control to determine the effectiveness of any remedial measures taken, or to determine the effect of scraping on corrosion rates.

This paper was presented to Division of Production, before the Twenty-second Annual Meeting of the American Petroleum Institute, San Francisco, November 6, 1941.

The statements and opinions expressed herein are those of the author, and should not be construed as an official action or opinion of the Institute nor of this publication.

WHEN trunk gasoline pipe lines first were being designed, some operators believed that pipeline scrapers never would be needed. They concluded, quite correctly, that a refined product such as gasoline certainly would not react with the pipe wall. Wax or paraffin deposits from such gasoline clearly were out of the question.

After the first few months of operation the operators usually became aware that something unforeseen was beginning to happen: At first the collection of "mill scale" in strainer baskets or in separators began to increase. Next, and in view of expanding markets much more serious, the line capacities began to drop. The results of investigations, already known to most of those interested in corrosion, showed that the "mill scale" was ordinary rust, containing appreciable amounts of the lower oxide; that the rust was forming on the interior pipe wall in general; and, finally, that the corrosion was the result of water and oxygen carried in the stream in very minute quantities, but cumulatively deposited on the pipe wall.

That such a phenomenon should take place in a gasoline line might have been predicted from experiences with internal rusting of gas lines. Apparently when the hydrocarbons transmitted are of low molecular weight, their tendency to wet the pipe wall is less than that of water. This promotes the cumulative deposition of the water and oxygen. The source of the traces of water and oxygen in gasoline is usually the storage tanks used at the origin of the pipe line.

The principal problems posed by internal corrosion were:

1. How to restore and maintain pumping capacity.
2. How the progress of corrosion was affecting the pipe wall.
3. How the corrosion process itself might be controlled.

The immediate answer to the first of these problems is the use of scrapers to clean the pipe. The solution of the third is fundamental, and automatically provides answers to the other two. The method of attack on the second problem is the subject of this part of the symposium, and should be useful in attaining a perspective of the economics involved, as well as in providing a control over the effects of any remedial measures taken.

Perhaps the first indication of the amount of internal corrosion in gasoline lines is to be found in the reports of difficulties with strainers or settling tanks. The rust did not arrive at a uniform rate, but rather in batches. Averaged over long periods the number of strainers full, or inches of sediment, was higher from those parts of the lines nearer originating tanks. Also, on the average, the hydraulic friction was worse near the origin of the lines. From the more remote parts of the lines the scale retrieved carried larger proportions of the lower oxide than did the scale from the line nearer the origin.

Although all these observations combined to help explain what was happening, they shed little light on the quantitative question of how much corrosion was taking place. The data the writer has been able to gather at best furnish only a semi-quantitative answer. With a demonstrated need for more definite data, some of the methods of measurement (to be described) are planned for extensive application.

To determine the "amount" of corrosion inside a pipe the investigator has the traditional two choices. He may choose as the measure of corrosion either the depth of penetration, or the weight

loss, or both. Except in the instance when the corrosion is general and the pits so small and numerous that they practically merge, there is no reliable relation between depth of penetration and weight loss. If the corrosion tends to localize and produce deep pits, the pit depth is the better criterion of the trouble to be expected. Internal corrosion of gasoline lines, however, occurs in a thin film of water as the result of oxygen diffusion. Because of this, the corrosion resembles atmospheric corrosion. The attack is generalized, and the pitting of the hard base metal at any time presents a relatively low

Under these conditions weight loss is our criterion of the "amount" of corrosion.

A few interested individuals have made observations of the amount and extent of internal corrosion, and have been kind enough to permit the inclusion of their data. One of the most complete records[1] can be summarized as follows: During scraping operations debris displaced by the scraper was removed by collecting it in a scraper pit at the middle of the 8-inch line. A record of the volume of debris was kept which showed the number of gallons removed, the weight per gallon, and

this, on the other hand, is the amount of scale entrained and removed without benefit of scrapers. Accordingly, they have increased the total measured debris by 25 percent to allow for unmeasured scale. Table 1 tabulates the results. During the range of these observations the approximate throughput of the 6-inch line was 15,000 barrels per day.

The reports of other observers,[2] whose comments the writer gratefully acknowledges, refer to different methods of observation which have led them to the generally accepted conclusion that the amount of corrosion is unimportant com-

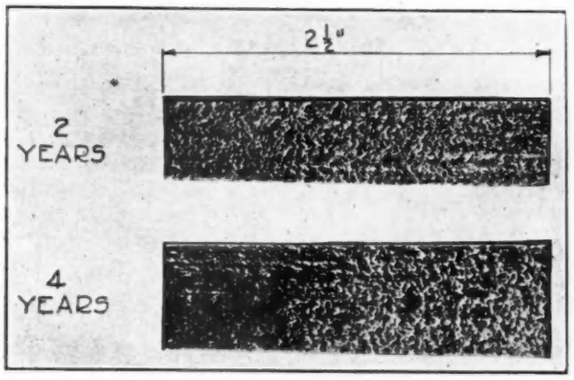

FIGURE 1 (Above)
Typical Sections of Pipe Wall Subject to Internal Corrosion.

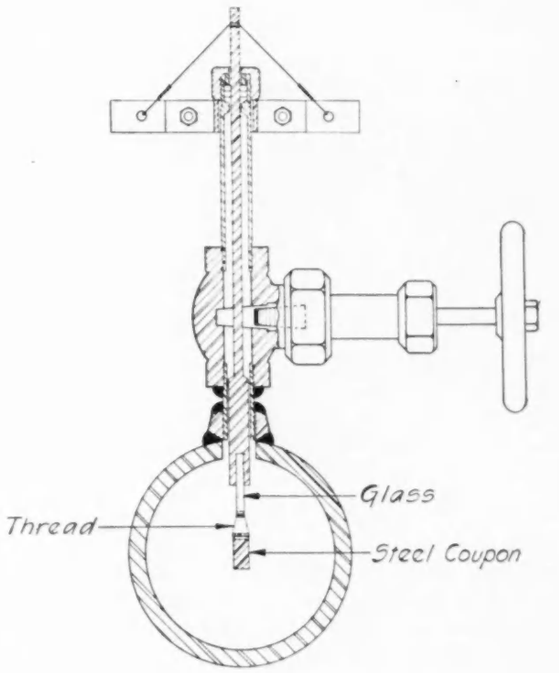

FIGURE 2 (Right)
Measurement of Internal Corrosion by Test Coupons.

profile. In Figure 1 are shown two rather typical sections of pipe wall that was subject to internal corrosion. The narrower piece shows the effects of two years' exposure, and the wider one shows the effects of four years' exposure. Both were originally part of the same joint of line pipe, so that they had an equal start and identical environments. These coupons, incidentally, were cut from the top of the line.

Examples such as these, coupled with continued observations of interior conditions wherever the line is opened, lead to the picture of internal corrosion as a generalizing rusting, with pitting of any severity a rare occurrence. The damage to be expected is, therefore, not the occasional leak, but the general reduction of the pipe wall.

the per cent of iron oxide (based on analysis). From this the total weight loss, corresponding to the rust, was calculated in percent of the weight of steel in the line. As the scale measured came from the inlet end of the line, where corrosion rates are higher, the point of measurement would favor too high a figure. More than compensating

TABLE 1

	Weight Loss (Percent)
1939, first three quarters	0.103
1939, fourth quarter	0.077
1940, first quarter	0.057
1940, second quarter	0.058
1940, third, fourth quarters	0.055
1939 total	0.18
1940 total	0.17

pared to some of the unhappy effects. The rust is reported in sufficient quantities to plug strainers, increase friction so as to necessitate scraping and, in finely divided form, to cause excess wear of moving parts of pumps or metering equipment. As is to be expected, there is a good correlation between severity of experience and throughputs of the lines.

In the examination of a line converted from crude-oil to gasoline service, severe internal pitting has been noted;[3] but it is reasonable to ascribe this to the crude oil pumped for 22 years prior to the pumping of gasoline. The pitting in this case was confined chiefly to the bottom, as is usual in crude-oil lines, with tuberculated rust over the upper three-quarters of

the inner surface. The tubercles are more characteristic of corrosion found in gasoline lines.

One correspondent [4] reports that internal corrosion in a new line has been avoided entirely by dehydrating the gasoline.

Data on internal pitting [5] were taken from 685 miles of 8-inch line, the maximum internal pit depth being recorded each time an opening in the line permitted observation. A graph of pit depth versus pumping was increased, it was hoped that flushing a gasoline line with water would remove the rust and improve the line capacity. Accordingly, 32 miles of 8-inch line were flushed with water as an experiment. After a week of pumping, during which the water was allowed to settle and separate in an 80,000-barrel tank, the experiment was abandoned, because no useful improvement in hydraulic friction had been achieved. Examination of impossible to account for the finely divided rust that did not settle out in the tanks, so that we can conclude only that the loss from internal corrosion amounted to a little more than 0.4 percent of the pipe wall per year. This is the average for a time of 5 years during which the line was not scraped, with the throughput running 15,000 to 22,000 barrels per day.

Since that time, scrapers have been in continual use to maintain

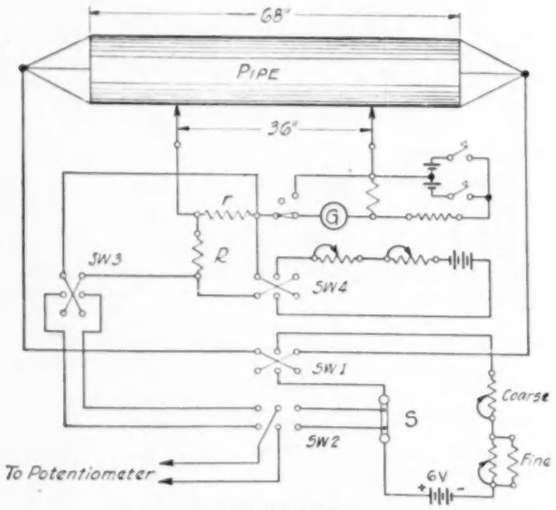

FIGURE 3
Circuit Used in Measurement of Internal Corrosion.

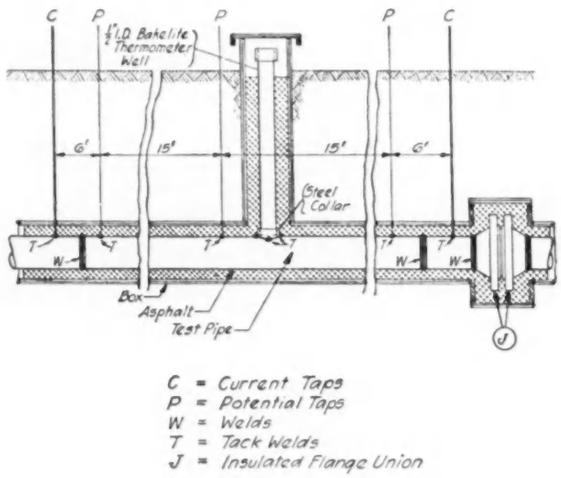

FIGURE 4
Section of Pipe for Observation of Variation in Weight.

location shows no correlation between the two. The curve of distribution of pit depths shows that 80 percent of the pits measured lie between 0.021 inch and 0.046 inch, the division being at 0.030 inch. The deepest maximum pit was 0.072 inch, and the shallowest was 0.017 inch. The first 6 months of line scraping in 1941 yielded 1,800 cubic feet of scale, which calculates to an approximate loss of 0.1 percent of the line.* This corresponds to 0.2 percent loss per year, a figure which is probably too high in view of a recently intensified scraping program.

In view of the amount of rust often entrained when the rate of the interior of the line showed that the rust adhering to the pipe wall was undisturbed. The water had removed most of the loose scale which normally settles to the bottom of the pipe.

Inside the tank, a survey of the rust that had settled from the water indicated that about 32 tons of ferric oxide had collected. A simple calculation shows that the removal of one ton of oxide per mile of 8-inch line corresponds to a general loss of 3¼ thousandths of an inch of wall surface. This corresponds to a loss of about 1 percent. When the same line was scraped, the scale removed was about equal to that flushed out. The interior of the line, even when inspected immediately before and behind a scraper, showed no visible difference due to the passage of the scraper. The wall was left covered with tightly adhering rust, but the hydraulic friction was restored to a satisfactory value. There apparently was no way to estimate the amount of corrosion product left in the line. It was also the line capacity. As this is successful, one would expect that some equilibrium had set in between the rate of corrosion and the rust removed. Although this probably is so, several difficulties prevent any accurate estimate of the corrosion rate from observations of rust removed. There are the facts that the finer rust is carried farther, that the scraping schedule is not uniform and, finally, that a reasonable measurement of the rust in this case is difficult to make. Besides this, there still is the fact that corrosion rates are higher at the beginning of the line. Accordingly, we shall turn our attention next to methods for measurement of internal corrosion, which are of a more direct nature.

The Measurement of Internal Corrosion

We have seen why weight-loss methods of measuring the amount of internal corrosion are particularly applicable to the problem. The systematic measurements that have been made in general belong

* Calculations of metal lost are based on 97 pound of ferric oxide per cubic foot of "scale." This density is an average value, the measured values ranging from 80 pounds to 126 pounds of ferric oxide per cubic foot of scale, from data of Toledo-Northern and Susquehanna Pipe Lines. Phillips Petroleum estimates the average of scale in its settling tanks to be 225 pounds per cubic foot, the scale being nearly all ferrous oxide. This would increase the foregoing yearly weight loss up to slightly more than 0.6 percent.

The differences in composition of the scale are due to reduction of the oxygen tension with distance from the oxygen source.

to two classes: measurements made on weighed coupons introduced into the line, and measurements made on the pipe wall itself. We can omit safely most of the laboratory experiments, because they do not reflect convincingly the rate of corrosion to be found inside a pipe line. These experiments are useful rather to explore the nature of the reaction and the results of its treatment than to measure its rate in a pipe line.[6]

Measurement of the internal corrosion by the use of test coupons requires the insertion of the coupons into the stream. In Figure 2 is shown one method of doing this. Another method, permitting use of larger specimens, is described by Morris and Schulze.[6]

The coupon consists of a steel sample, carefully weighed, and provided with a hole at one end for mounting. By means of the hole, the coupon is fastened with a thread to the glass rod through which a lateral hole has been drilled. This rod is held in a steel socket at the end of a ¼-inch rod extending through the stuffing box. The shoulder on this socket prevents a possible blowout, and by means of the stuffing box the coupon can be raised out of the way of scrapers—or, using the valve, it can be removed entirely. Although the corrosion rate experienced by such test coupons corresponds roughly to the corrosion rate experienced by the pipe wall after sufficient elapsed time, I doubt that the relation is precise enough to permit extrapolation from so small an area. The chief difficulty in using coupons to measure this corrosion is that there is a time delay after immersion before corrosion begins in earnest. To follow the progress with time, many coupons are needed—because having been cleaned for weighing, a coupon must pass through the initiating period before corrosion proceeds as before. From the results at hand it is evident to the writer that too few coupons have demonstrated only the range of their variation.

In view of the unknown effect of scraping on the rate of internal corrosion, and considering the possibility that unusual turbulence might affect the corrosion rate of the coupons, it is eminently desirable to measure the corrosion of the pipe wall directly.

Two types of experiments are in progress for the measurement of weight loss directly on the pipe wall. In the first experiment a joint of pipe was cut into four sections, each of which was sandblasted clean. The ends of these sections were machined square and perpendicular to the bore. Careful measurements were made of each section, recording the length and the weight. These weights were reduced to pounds per foot of length. The sections then were welded into a trunk line. The outside of the line was protected by a box filled with asphalt to limit the corrosion to that occurring inside. The observations were scheduled to be made at the end of 2, 4, 8, and 16 years. The first two sections have been removed and weighed, with the results shown in Table 2.

TABLE 2

Test Piece	Date Installed	Weight (Pound Per Foot)	Date Removed	Weight (Pound Per Foot)	Weight Loss: Pound Per Foot	Weight Loss: Days	Weight Loss: Years
No. 4	10-31-36	28.21 [3]	10-27-38	27.79 [7]	0.41 [6]	726	1.988
No. 2	10-31-36	28.28 [5]	11-20-40	26.47 [9]	1.80 [6]	1,481	4.06

Average weight loss, 1936-1938, is 0.20 [9] pound per foot per year
Average weight loss, 1936-1940, is 0.44 [4] pound per foot per year
Average weight loss, 1938-1940, is 0.67 [1] pound per foot per year

These figures indicate that, when this line is scraped, the weight loss averages between 1½ and 2 percent per year. This particular experiment, however, was conducted at the point where corrosion was the most active and, accordingly, it became desirable to investigate the distribution of corrosion, as well as its behavior with time, at other places. Inasmuch as this would involve considerable difficulty using the pipe sample, another method, which is an outgrowth of the first, is now projected.

Upon the removal of the pipe sections for reweighing, the pipe again was machined square (though shorter). The weight of the section was determined by means of careful measurements of the pipe resistance. This method of determining the weight of the pipe depends upon the fact that the electrical conductance, of a fixed length of a cylindrical conductor varies directly with its weight and inversely with its temperature.

Because of the shortness of the sections, the measurements were made by use of the circuit shown in Figure 3. Referring to Figure 3, the test current passing through precision shunt **S** and reversing switch **SW1** is delivered to the ends of the pipe through bridles of four wires attached at evenly spaced points around the ends. These bridles serve to distribute the current as evenly as possible to the ends of the pipe. A distance of 3 feet is measured off in the center of the pipe, leaving a distance of 16 inches at each end for uniform current distribution. The 3-foot distance is marked off parallel to a generatrix of the cylinder. Four such short spans, in different quadrants, are used to afford a check. These distances must be measured to a precision of ±0.036 inch to attain an accuracy of 1/10 of 1 percent. The foregoing measurements were well within this limit. The potential measuring circuit consists of a Brookes deflection potentiometer with a precision adjustment of 0.04 percent, connected to the switch **SW2.** This switch tranfers the potentiometer from the current shunt **S** to the potential ratio network shown in the center of the drawing. When the current is reversed by means of switch **SW1,** it is necessary to reverse the leads of the potentimeter by means of **SW3.** The potential ratio network consists of two resistances **R** and **r,** through which a current is passed by means of a battery and rheostats and reversing switch **SW4.** The **IR** drop in the resistance **r** is used to return the reading of galvanometer **G** to zero in the presence of the **IR** drop due to the current passing through the section of the pipe under test. Included in this galvanometer circuit also are thermoelectric e.m.f.'s * and contact potentials of unknown value. It is because of the presence of these that it is necessary to reverse the current and the potentiometer and to repeat the reading. Examination of this procedure by the reader will convince him that the sum of the potentials measured divided by the sum of

* Electrical motive force.

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Type 40	4,000	4½"	150 H. P.	4	4
Type 50	5,000	4½"	350 H. P.	6	3
Type 75	7,500	4½"	500 H. P.	6	3
Type 100	10,000	4½"	650 H. P.	6	3
Type 125	12,500	4½"	950 H. P.	6	6

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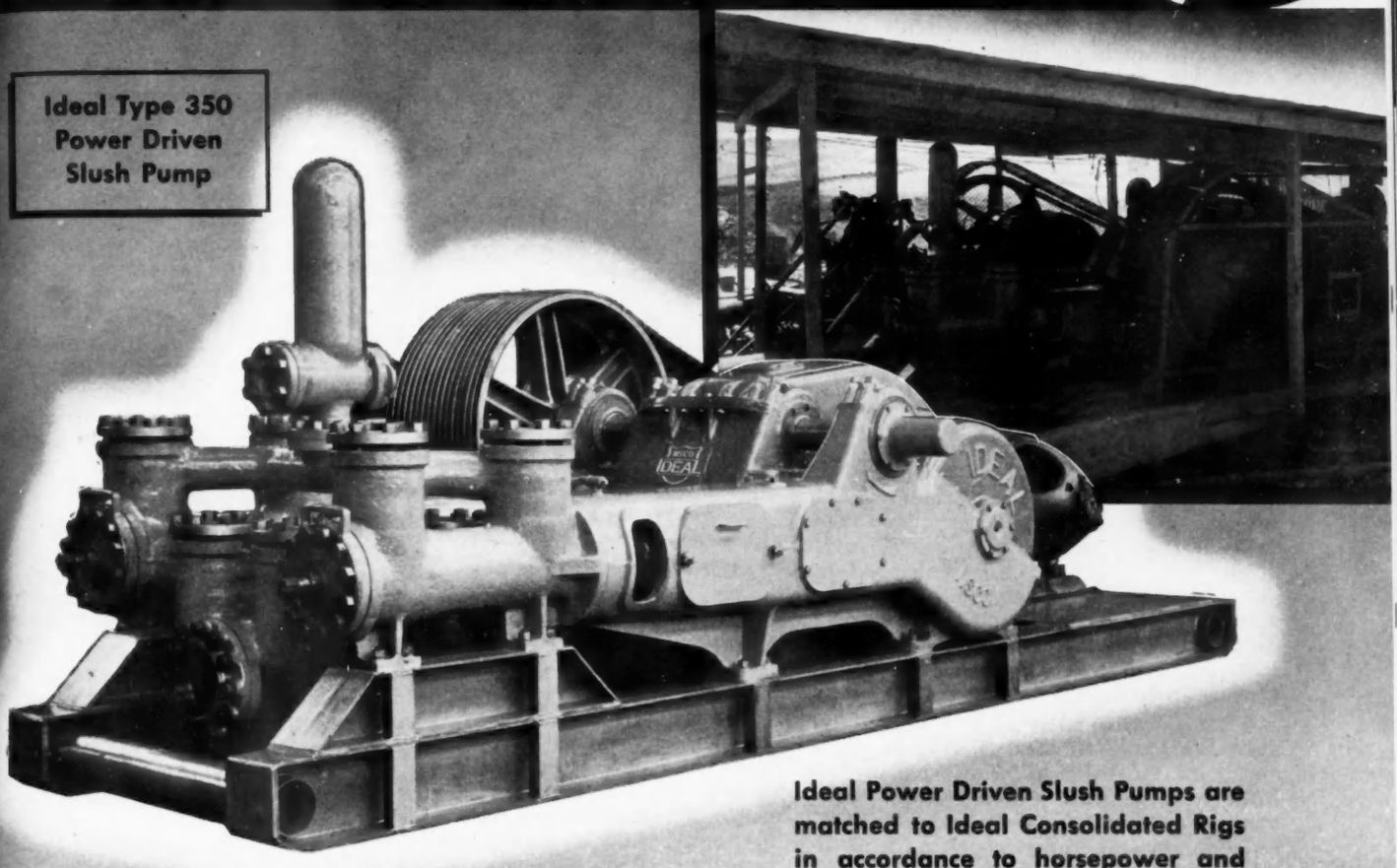

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C-150 6¾" x 12"	177	150	2000 lbs.	17900 lbs.
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the currents used will be the desired resistance, independent of the stray potentials of the circuit.

The two push switches and corresponding batteries shown beside the galvanometer are used to speed up the readings. The galvanometer used has a sensitivity of 2×10^{-9} ampere per division. In the circuit as shown such an instrument is exceedingly over-damped, so that the two push switches referred to were used to introduce a small current to place the galvanometer at its zero, where it could be observed for any drift which would indicate an off-balanced condition. As the potentiometer was connected across the two resistances **R** and **r** in series, the potential used to balance the **IR** drop on the pipe could be multiplied by any convenient ratio. A convenient ratio is one permitting the use of the same high range of the potentiometer for both current and potential readings. After the apparatus has been adjusted for convenient ranges on the potentiometer, this ratio is measured by passing a steady current through the two resistances in the series, and by measuring the corresponding **IR** drops with the precision potentiometer. This is preferable to using a wheatstone bridge. †

After the resistance of the pipe specimen has been measured, it is necessary to saw a piece of steel from the pipe wall, machine it to a uniform diameter, and measure its resistance per unit length and weight per unit length. In measurements of the resistances of both pipe and pipe-wall sample, the temperature of the steel is recorded. It is essential that no piece of pipe wall which has been subjected to welding or other violent change in its history of heat treatment be used in the measurements (for instance, a coupon cut out by means of a torch would be useless in determining the resistance of the pipe). Finally, a measurement must be made of the temperature coefficient of resistant for the steel coupon, and this figure used to correct the data from the coupon to fit the data measured on the pipe. In this instance a cylinder 4.113° inches long was machined from the pipe wall. Its diameter was constant within 0.0001 inch, and averaged 0.2769 inches. This sample weighed 31.8534 grams, and had a temperature coefficient of 0.003 per degree C. While mentioning these figures, it should be pointed out that they are not usable for any other piece of pipe. Both the specific resistance and the temperature coefficient are sensitive to the carbon content and other alloying material and to the heat history of the steel, a fact which will necessitate measurement of these properties for each section of pipe weighed in this manner.

In projecting this work to cover more of the pipe-line system, it is possible to simplify the measurements to a great extent. Figure 4 shows how a section of pipe is prepared so that its variation in weight can be observed without interrupting operation of the line. Simplification in measurement is achieved, because it is possible to make measurements on a longer section of pipe. (For the purpose of obtaining a check, the longer section can be divided into two smaller ones which will show whether the corrosion has a perceptible lack of uniformity). The potential connections **P** at the ends and in the middle of the test pipe should be made by brazing the copper cable to steel lugs which can be tack-welded to the pipe in a manner which will heat the very minimum amount of pipe wall. The thermometer well can be attached in the same way. These conections, the entire joint of pipe, and the insulating joint are all included in a box which is poured full of asphalt. The purpose of the insulating joint is to eliminate stray currents which would interfere with the readings. The asphalt, besides protecting the outside of the line from corrosion, extends the insulation provided by the joint to include the entire electrical circuit.

Although the bottom of the thermometer well is made of metal tacked to the pipe, the extension above and beyond the asphalt box should be made of bakelite or similar material to avoid errors in the temperature readings due to heat conduction (therocouple arrangements might be devised if desired). When an installation of this sort is made, a sample (about a foot long) of the joint of pipe on which the electrical readings are to be made should be sawed off. This sample is used to measure the temperature coefficient of that particular pipe wall. If a reading is made of the pipe resistance and temperature at the time of installation, the conductivity, say at 15° C, can be used to represent 100 percent of the weight of the pipe. As corrosion proceeds, it then becomes possible to determine directly what percentage of the pipe wall has been lost by repeating measurements of the pipe temperature and resistance. The resistance must be measured to the same precision with which it is desired to obtain the weight of the pipe, and the temperature measurement should be made with care in view of the fact that approximately 0.3 percent error will be made for each degree C the reading is wrong.

Projected installations of this type of test section include sections of line before and after scraper traps, as well as sections of line which are scraped but which lie at opposite ends of a long transmission system. Future measurements will give the effect of scraping or a direct measure of the effectiveness of any means undertaken to control the rate of corrosion.

Conclusion

In conclusion, we should note that the present data are still too meager to permit really quantitative conclusions to be drawn. The outstanding results of the examination of the data on the amount of internal corrosion in gasoline lines can be summarized:

1. The rate of corrosion is higher in proportion to the amount of moisture and oxygen introduced into the pipe line.

2. The rate of corrosion is highest at the point where these elements enter the line, and drops rather sharply at the more remote points.

3. Depending upon pumping rates (1), and upon location (2), the weight-loss rates of corrosion vary from 0.1 to 2.0 percent of the pipe wall per year.

4. There is some evidence that scrapers used to improve gasoline-line capacities increase the average rate of corrosion.

5. The data contain no reason for alarm in regard to the effect of internal corrosion on the life expectancy of gasoline lines. Soil corrosion and other external factors still deserve first consideration.

† A precision-type Kelvin bridge, when available, can be used to measure pipe resistance as an alternate method.

BIBLIOGRAPHY

[1] Courtesy, D. A. Sullivan, chief engineer, The Pure Oil Company.
[2] E. A. Koenig, Magnolia Pipe Line Company; and Fred E. Wood, Standard Oil Company (Indiana).
[3] J. W. deGroot, Tuscarora Oil Company.
[4] R. R. Irwin, Socony-Vacuum Oil Company, Inc.
[5] R. C. Alden, Phillips Petroleum Company.
[6] L. C. Morris and W. A. Schulze, "Internal Corrosion of Gasoline Pipe Lines," Proceedings API **20 [IV] 14 (1939).**

Causes and Prevention of Drill Pipe and Tool Joint Failure

PART 2

By R. S. GRANT, Hughes Tool Company
and
H. G. TEXTER, Spang Chalfant, Inc.

THE first installment of this article appeared in THE OIL WEEKLY of November 10. It discussed drill pipe failures due to twistoffs, spiral tears, tension, threads, and a number of fatigue causes.

The third and final installment will be published next week, and will take up tool joint failures.

These articles were all presented in a paper before the Division of Production of the American Petroleum Institute at the 22nd Annual Meeting in San Francisco, November 6, 1941.

XII. Deficient Mechanical Properties of the Steel

Drill pipe is heat-treated for the purpose of refining the grain structure of the tube, and particularly for improving the coarse-grained structure usually produced in the upsetting operation. Naturally, some consideration has been given to the desirable minimum impact strength in the upsets, because it is believed that high impact strength is related to high notch-fatigue resistance.

If not properly heat-treated, excessively low impact strength may obtain—and several cases of notch-fatigue failure have been attributed to—low impact strength in the metal. Fortunately such instances very rarely are encountered because of the care taken in manufacturing to avoid this condition. This is a condition which can be determined very readily by metallurgical examination of the product, either before or after failure has occurred.

XIII. Grade of Steel

So far there is no conclusive evidence that steel of higher strength than the API grade "D" will resist notch fatigue failures better. When fatigue from pure tension or torque or bending or a combination thereof is concerned, a higher-strength steel, of course, is definitely better. In very deep wells, for example, higher tensile-strength drill pipe gradually is proving to be worthwhile.

In notch-fatigue failures, however, the stress causing the failure is often quite low, and other things such as size, position, and shape of the notch, or the frequency of the stress reversals, are factors so much greater that there is grave doubt as to whether higher-grade and, therefore, more expensive steel is justified. Also, it is definitely known that a higher-strength steel does not necessarily have greater notch-fatigue resistance.

6-c. Corrosion Fatigue

In many areas of rock-bit drilling, particularly in the Mid-Continent, the most common cause of drill-pipe failure is corrosion fatigue. Just why it is confined almost exclusively to rock-bit territory is not entirely clear, but the fact remains that along all of the Gulf Coast and in many parts of California, where the formations are soft and are, or could be, drilled with fishtail or drag bits, there are almost no failures which can be attributed to corrosion fatigue. The explanation must be tied up with the fact that formations drillable with drag-type bits are relatively young, geologically, and have the following general characteristics:

a. They contain few or no salt or anhydrite sections (except salt domes which are never drilled anyway, or only through thin, overhanging sections).

b. There is almost no hydrogen sulfide, except in a few of the old shallow fields.

c. Being late, geologically, the formations are unconsolidated, and their clays make good colloids which definitely coat and protect steel from corrosion.

d. Heavy muds are almost a necessity to make the holes stand up, and this, again, aids in protecting drill pipe from corrosion.

e. And last, but not least, the drilling of soft formations, particularly with drag bits, tends to develop high torque in the drill stem. This tends to spiral the pipe in the hole, thereby preventing whip and this, in turn, reduces the stress reversals in the drill pipe; a reduction in stress reversals, in turn, reduces corrosion fatigue, as discussed hereinafter.

Of greater interest is the mechanism of corrosion fatigue and, above all, a means for reducing or preventing its effect. Sad to relate, the diagnosis is much simpler than the cure.

In its simplest form corrosion fatigue may be considered as notch fatigue in which a stress-concentration point has been formed by a corrosion pit and the fatigue progress is hastened by the corrosion. This is only part of the story, but it is a correct conception and helps explain the complete sequence of events.

In place of the sharp-file notch, in the nail which is to be broken in a vise, we now can substitute a corrosion pit. Not just any pit will

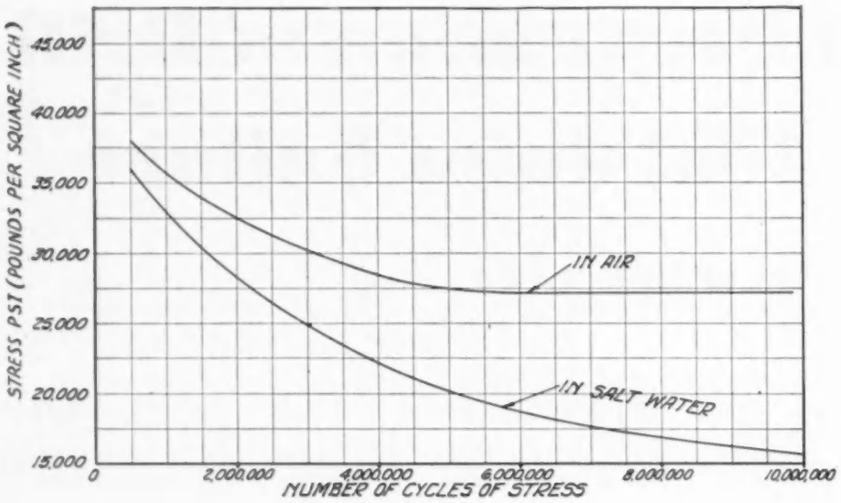

FIGURE 22

Typical Fatigue Curves of a Steel Tested in Air, and in Salt Water

serve, only a sharp-bottomed one; and if only a single pit ever formed as steel corroded, it often might not happen to be sufficiently sharp-bottomed to cause trouble. Inasmuch, however, as is the case in any small area, thousands of microscopic pits start forming at the same time, and it is easy to imagine that some of them will be of the right shape—and running in the right direction—to substitute for a transverse mechanical scratch.

To realize that corrosion alone will weaken steel in resistance to bending, we only need recall how much easier it is to snap off a rusty steel nail, sticking in a board, than a bright new one; or how much easier it is to break rusty wire, by bending it back and forth, than new wire. Both of these are good illustrations of every-day corrosion fatigue. Another common example is the cracking-through of rusty sheets, being torn from a building, as compared with the surprising ductility of new sheet steel.

It is quite easy to understand all of these failures, because they involve the theories of causing fracture where the metal has been stressed, far beyond the yield point, by its having been stressed violently. But what surprises the average user of drill pipe are the failures which occur when he knows full well (and correctly) that the metal is *not* being stressed to what ordinarily would be a dangerous degree. This is where we must leave "common-sense" theory and go into the realm of "pure" theory. We must go back again to the "S-N" (stress vs. number of cycles) curves. This time two curves are used; as an illustration, see Figure 22. In one curve the specimen is bent back and forth in a non-corrosive medium (air), and the other curve shows what happens when the specimen is surrounded by a mildly corrosive liquid (like salt water).

As before, these curves show (approximately) how many stress reversals are required at any given stress to cause fracture; but they also show graphically how very much lower the stress need be, with a given number of stress reversals, to cause fracture in salt water as compared with air. And this is what is called "corrosion fatigue."

Thus, the upper curve shows that a given piece of steel, when bent back and forth in air with a maximum stress of 32,500 pounds per square inch, will fail at 2,000,000 cycles; whereas the failure in salt water, under otherwise similar conditions, will occur at only 1,100,000 cycles. Or, to put it even more strikingly, the "endurance limit" of this steel, in air, is 27,000 pounds per square inch—meaning that ten million, or twenty million, or any number of stress reversals, never will make this steel fail, whereas salt water (just a mildly corrosive medium) will cause fracture at only 2,300,000 cycles at this same stress.

This means that drill pipe mildly stressed in a non-corrosive mud might drill almost indefinitely, whereas in salt water it might start to fail in its third or fourth well—all of which is quite a mystery until the significance of the foregoing curves is understood correctly. It means, too, that the "endurance limit" has been lowered very definitely, and in order to obtain the same life the drill pipe must be stressed less. Or, the operator must be resigned to much less life from his pipe in corrosive drilling muds than in non-corrosive ones.

To illustrate this rapid decrease in life, a number of bending fatigue tests recently were made on small samples of drill pipe, all cut from the same pipe and all stressed to the same degree, about 31,500 pounds per square inch. The only variation in conditions was the medium in which the specimens

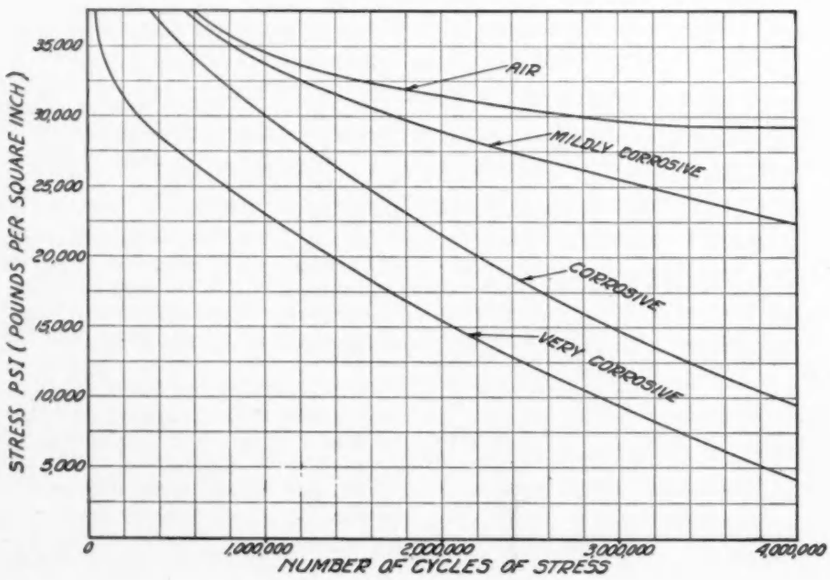

FIGURE 23

Typical "S-N" Curves for Steel in Various Media

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were stressed: air or distilled water as non-corrosive media, salt water as mildly corrosive, magnesium chloride as a definitely corrosive solution, and dilute hydrochloric acid as very corrosive.

The results of this series of tests are as follows:

Number of Tests	Average Maxium Stress (PSI)	Medium	Number of Cycles to Failure
14	31,500	Non-corrosive	2,200,000
5	31,500	Mildly corrosive	1,430,000
6	31,500	Corrosive	860,000
6	31,500	Very corrosive	182,000

Although run quite carefully, the foregoing tests were not considered as a scientific study of the exact effect of the various media, and no attempt was made to duplicate field conditions. The aim was to treat each specimen exactly alike, except for the medium in which it was stressed, and to show how very remarkably the life of the specimen is decreased as the corrosiveness of the fluid is increased.

If these tests had been completed, through various stresses, the resulting "S-N" curves might look something as indicated in Figure 23.

To put the foregoing figures into imaginary footage figures they could be divided by 50, thus:

Medium	Hole Drilled before Failure (Feet)
Non-corrosive	44,000
Mildly corrosive	28,600
Definitely corrosive	17,200
Very corrosive	3,600

Although imaginary, these figures are not far from actual practice when 4½-inch pipe is used. Thus, in non-corrosive rock-bit territories, such as North Louisiana, East Texas, parts of Oklahoma, parts of California, Wyoming, Alberta (Canada), etc., where the digging is considered pretty hard, it is quite common to drill forty to fifty thousand feet of hole before drill-pipe failures start to occur. And, at the other end of the scale, there are numerous cases of failures which occur in the first well, at less than 4000 feet. This would be in very corrosive "hot spots," with hydrogen sulfide present, such as in parts of West Texas, northern Oklahoma, many parts of Kansas, and southern Arkansas.

Mildly corrosive territories would cover most of Oklahoma, North Central Texas, West Texas, New Mexico, and a few parts of California. Definitely corrosive would be represented best by most of Kansas, except for the few spots that would fall in the very corrosive class.

In the actual tests just described, the specimens failed from either *external* or *internal* corrosion pits. In actual drilling, however, the failures almost always start from the inside. This is because any pit starting on the outside is polished off almost immediately by the rubbing of the pipe against the sides of the hole, so that only an inside pit ever can become deep enough to act as a notch (stress-concentration point). In pure fatigue, the fatigue cracks usually start from the outside, because the stress is highest at that point. Also, cracks from pure fatigue start near a tool joint, where the bending stress is highest, and to some extent the tool joint protects them from being polished off against the formation.

Going now a little further into pure theory, it must be understood first of all that there is no true endurance limit for steels subjected to corrosion. Under non-corrosive conditions the "S-N" curve for any given steel gradually flattens out into a straight line (at the endurance-limit point); and if stressed at or below this point, the number of stress reversals may be carried on indefinitely without ever causing failure.

Under corrosive conditions, however, the curve never becomes flat. In other words, there is no stress low enough which would permit of indefinite life of the specimen. This is illustrated clearly in Figure 22.

The reason is simple. The corrosion continually is adding nicks and notches to the surface of the steel so that, no matter how low the stress, there will be formed sooner or later a deep enough notch that the specimen will fail. Or, to put it another way, corrosion finally will eat its way entirely through the steel.

Therefore, there being no true endurance-limit figure, the life of

FIGURE 24
Effect of Corrosion from Salts in Bottom Section of Racked Drill Pipe.

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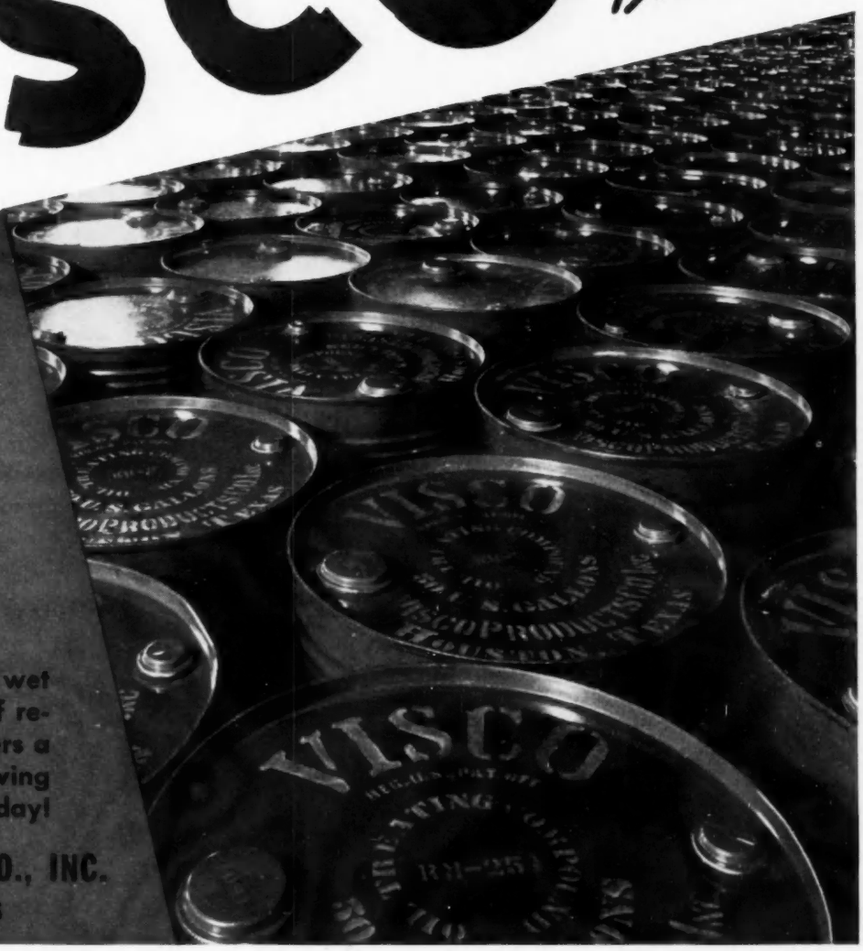

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steel in corrosive media must be expressed in units giving the number of stress reversals. Thus, a steel which has an endurance limit of, say 27,000 pounds per square inch in air might be said to have a limit in salt water of 20,000 pounds per square inch at 5,000,000 cycles, or 16,000 pounds per square inch at 10,000,000 cycles, or only 10,000 pounds per square inch at 20,000,000 cycles.

One practical conclusion from this is that drill pipe can deteriorate in storage, especially if laid down while still wet with corrosive drilling fluid. Even when seemingly dry, there will be enough condensed water from the air, or from rain, to keep the inside moist and allow corrosion to proceed. This is well illustrated in Figure 24, which shows very definitely a longitudinal line of corrosion (and cracks), at what was the bottom of the length as it lay on a rack, whereas the top half of the specimen shows very little corrosion and *no* cracks at all.

Obviously it would be worthwhile to flush out pipe which is to be stored. In fact, it even might be worthwhile to flush out each stand every time it is brought up out of the hole, if there were some practical way to do this.

Aside from the mechanical notch effect of a corrosion pit, produced by purely chemical action, there are other factors involved. These merely will be mentioned, because currently they are being studied practically in an effort to improve the life of drill pipe.

One factor is the electrogalvanic effect of mill scale found on any hot-rolled product. In contact with steel, and in the presence of even a very dilute salt solution, a battery effect is set up in which a minute electric current flows from the scale to the steel, from the steel into the fluid, and from the fluid back into the scale. This, of course, appreciably speeds up the purely chemical attack of the fluid. When direct current leaves steel, it carries iron with it, as ions, at the rate of 20 pounds per ampere per year.

An obvious remedy for this would seem to be the removal of the scale, by pickling or shot-blasting, at the time the pipe is made. Experiments along this line already are being carried out, particularly in California, and references to this subject are given in the bibliography of this paper.[1] Unfortunately, no well conditions in California are nearly so corrosive as in many areas of the Mid-Continent, and it is rather doubtful whether the beneficial effects indicated in the California experiments will be obtained in truly corrosive areas.

Another rather obscure factor in corrosion fatigue is the effect of stress on the relative electro-potential of steel. Stressed metal becomes electro-negative to unstressed metal and, here again, a minute electric current is set up in the presence of a salt solution and, again, the pitting is speeded up over that of purely chemical action.

Thus the whole vicious cycle of corrosion fatigue might be thought of as follows:

1. The chemical effect produces a minute pit. Also the electrogalvanic effect between scale, steel, and fluid produces another pit, or deepens the first one.

2. Then, as the pipe metal is bent, or stretched, the stress is concentrated at the bottom of the pit, just as at the bottom of a notch. This creates a difference in potential between the highly stressed bottom and the unstressed edges of the bit, and an electric current is set up which further deepens the pit.

3. Then, in a deeper pit the stress concentration becomes still greater and the electro-potential difference is greater, and the current becomes more effective in making the pit still deeper. And so on. Small wonder, then, that corrosion plus fatigue can reduce so greatly the life of drill pipe as compared with what either factor alone could do.

It is interesting to note that fatigue cracks from corrosion fatigue can, and do, occur almost anywhere along the length of pipe, whereas failure from pure fatigue is concentrated near the tool joints (as noted under item 6-a). This is nat-

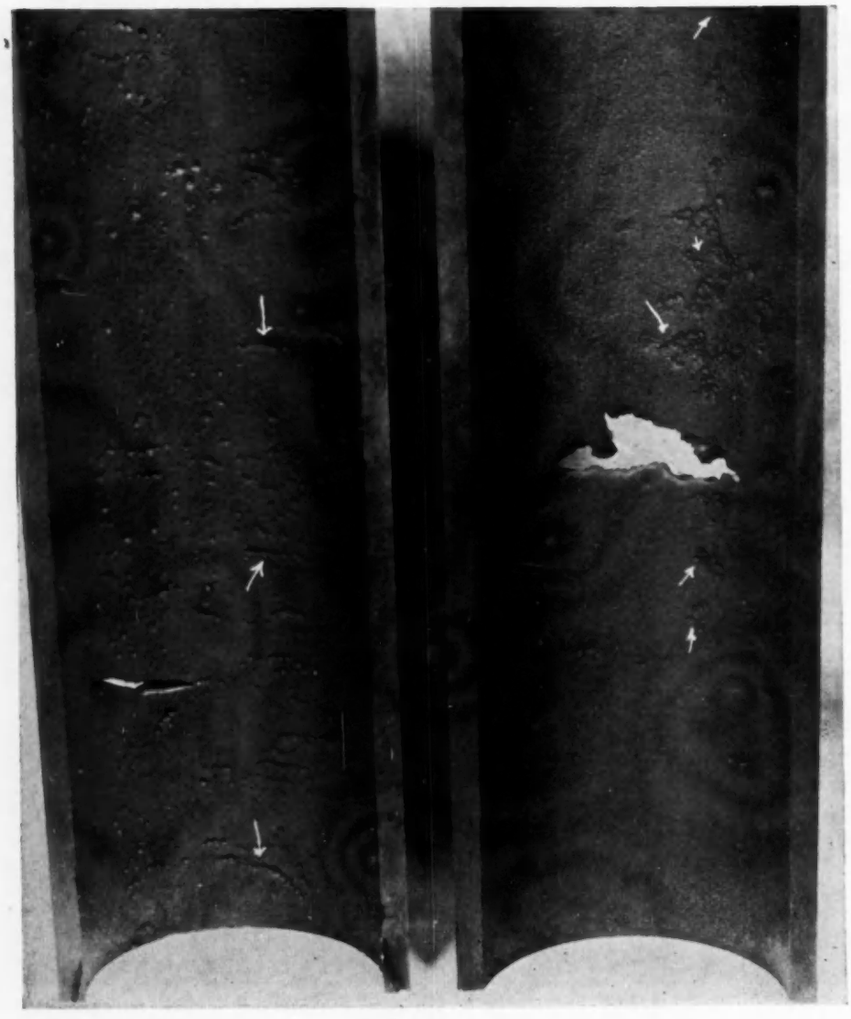

FIGURE 25
Typical Corrosion Fatigue, from West Texas.

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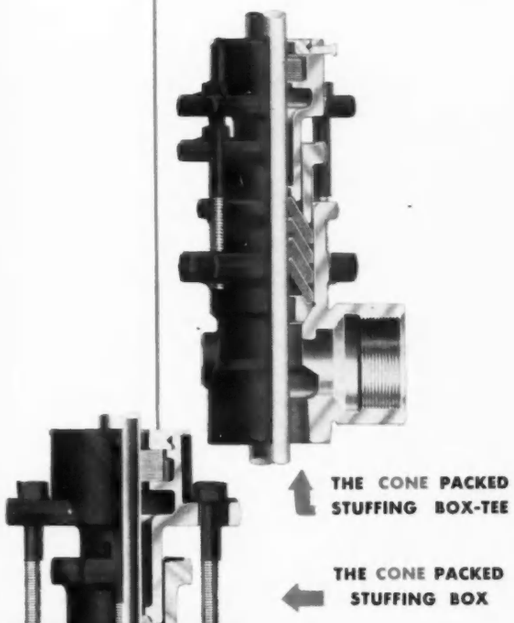

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ural, because corrosion can start almost anywhere, but pure fatigue will concentrate only where the bending stresses are greatest.

Also of interest is the fact that in cases of failure where the lengths have been run on with so much compression as actually to bend them permanently, the worst cracks are on the convex side of the bow. This might mean that the tension side of the bow is most susceptible to corrosion fatigue; or it might indicate that the convex side is where the pipe had worn thin by rubbing hard against the hole, leaving less thickness for the fatigue cracks to penetrate. Not too much is known about this point.

Figures 25 and 26 illustrate typical examples of corrosion fatigue taken from drill pipe operating in widely different areas. One is from West Texas and one from Kansas. Note that they look considerably alike. Of course, not all specimens have as many actual cracks started as those shown, but all cases of corrosion fatigue show the same general characteristics.

Another point in common, regardless of the locality, is illustrated in Figure 27. These are strip pulling tests cut from a sample of drill pipe which had failed from corrosion fatigue. Note the very great number of transverse cracks which opened up as soon as the metal was stretched in the pulling machine. They were mostly invisible to the eye, before pulling, and their existence is proof positive that corrosion fatigue was at work. Pulling test samples of pipe failing from any other cause, i.e., pure fatigue, notch fatigue, etc., never show these little transverse cracks, except possibly in the immediate vicinity of the failure. Hence, the laboratory can never be mistaken if corrosion fatigue is the cause of the trouble.

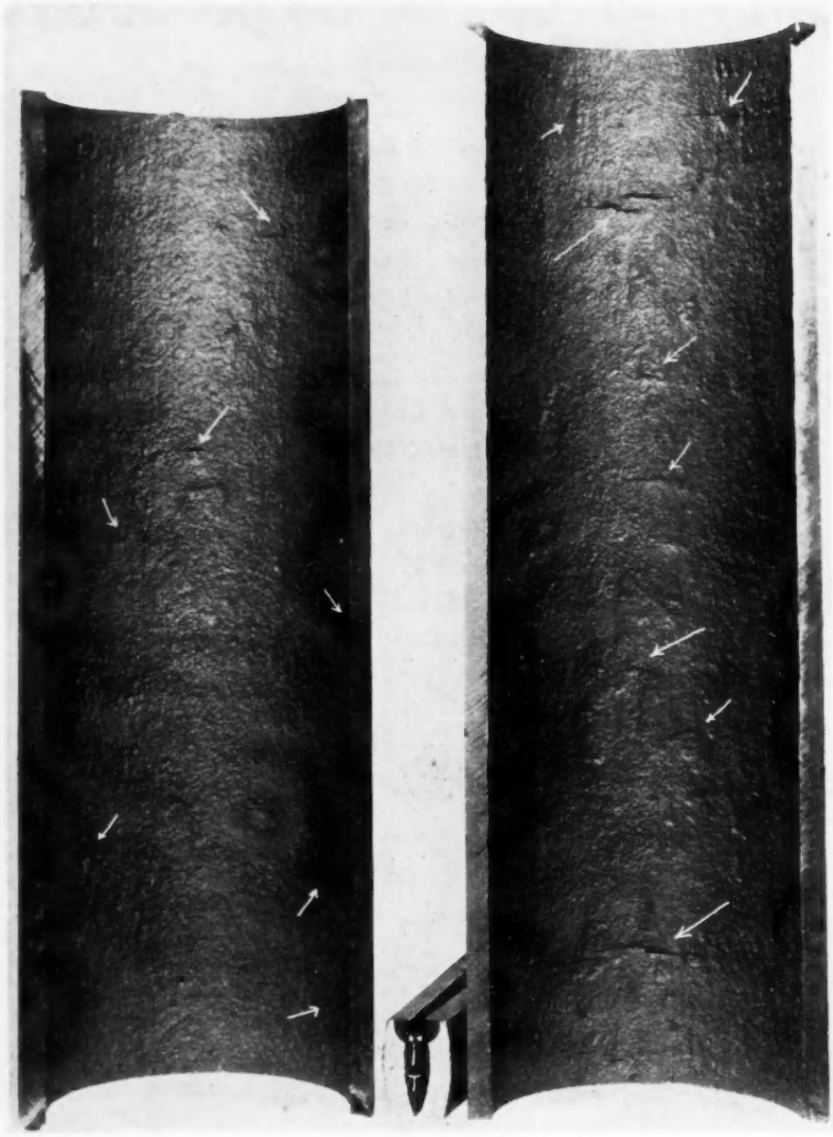

FIGURE 26
Typical Corrosion Fatigue, from Kansas.

So far there is no accepted method for preventing corrosion fatigue —although, as stated, practical study of the problem currently is being undertaken. Removing scale from the inside well might be the first step, but is probably only a short step. The real solution would seem to be coating the inside of the pipe so as to prevent corrosion entirely. However, the problem of finding a coating which could be applied readily, without pin holes, absolutely impervious to all drilling fluids ordinarily encountered, and with sufficient ductility to withstand tension, bending, hammering, and erosion by the mud stream, is not an easy task. The same problem has long been studied on sucker rods, with none too great success.

Galvanizing the inside of drill pipe might seem like a logical step, and has been tried in California, but without success, as it did not appear to be sufficiently permanent (Veyne Mason).[1] It might even be harmful, because the endurance limit would tend to be reduced by the brittle iron-zinc alloy layer in which cracks could form that would propagate through the steel. This difficulty, however, could be overcome by electro-depositing the zinc, but there are as yet no recorded experiments along this line.

Alloy steels, to prevent corrosion fatigue, are also quite disappointing. No doubt some truly corrosion-resistant alloys, such as the stainless steels or high-chromium alloys, would make good drill pipe, but their cost would be prohibitive.

The only present remedy for too rapid failure from corrosion fatigue is to lower the mechanical stresses to such a point that the stress factor becomes a minimum. When bending is the critical factor, enough drill-collar weight must be run on the bottom of the drill pipe to insure that the pipe is never in compression. That this is truly effective is borne out by a comparison of drilling practice in corrosive "hot spots." Those who run long, heavy drill collars above the bit *do not* have premature failures. Those who run the drill pipe in

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compression are the ones whose pipe starts breaking early in its life. This sometimes occurs even in the very first well.

When tension is the stress factor, as in wells 10,000 feet and deeper, the stress can be lowered by using tapered drill-pipe strings, with heavier-weight pipe on the top, or with both larger outside diameter and heavier weight. Fortunately, in most deep areas, corrosion is not a large factor.

Another possible remedy for corrosion fatigue would be chemical treatment of the drilling fluid. There is no doubt that any given fluid could be treated, in a laboratory, so as to render it absolutely non-corrosive, but to do this commercially at a drilling rig is a big problem. It would require very special mud-treating pits and 24-hour supervision by mud chemists. The trouble is that the fluid often is changing rapidly, in composition, especially while drilling through sections of salt, anhydrite, etc. Also, in many corrosive areas, the evil-smelling gas known as hydrogen sulfide is a big factor, and its content is extremely variable.

The quite indefinite conclusions of the API Subcommittee on Corrosion Fatigue of Drill Pipe is the best proof of all that chemical treatment of drilling fluid is still very much in the experimental stage. However, the committee's findings are of interest, and should be reviewed by all who are studying this phase of the problem.

As to why corrosion fatigue is so much more prevalent now than a few years ago, there seems to be a very simple answer. The drill pipe is being run under definitely higher stresses.

At one time, particularly in areas where corrosion is a factor, the predominant drill-pipe size was 6⅝-inch, or occasionally 5-9/16-inch. Now it is almost exclusively 4½-inch and 3½-inch and with holes being drilled which, although smaller, are not proportionately so. So naturally, even with reasonable care, the smaller drill pipe must surely be subjected to much higher compression, bending, and tension stresses. Then, too, wells are being drilled faster than a few years ago, mainly because of well-understood competitive conditions — and this again raises the stress factors. Small wonder, then, that drilling seems to have run into a new wave of trouble.

6-d. Hydrogen or Hydrogen-Sulfide Embrittlement

In corrosion fatigue, the cause of failure is the notch effect of pits caused by corrosion, and there is no intimation that the steel under the pits is any less resistant to fatigue than elsewhere. As emphasized before, the pit is merely a stress-concentration point, and has no more or less effect than a mechanically produced pit or notch of exactly the same size and shape.

There are still other corrosion factors, however, in which the steel itself is altered—at least temporarily—and are suspected of being the cause of certain astonishingly rapid drill-pipe failures. They are called "hydrogen embrittlement" and "hydrogen - sulfide embrittlement."

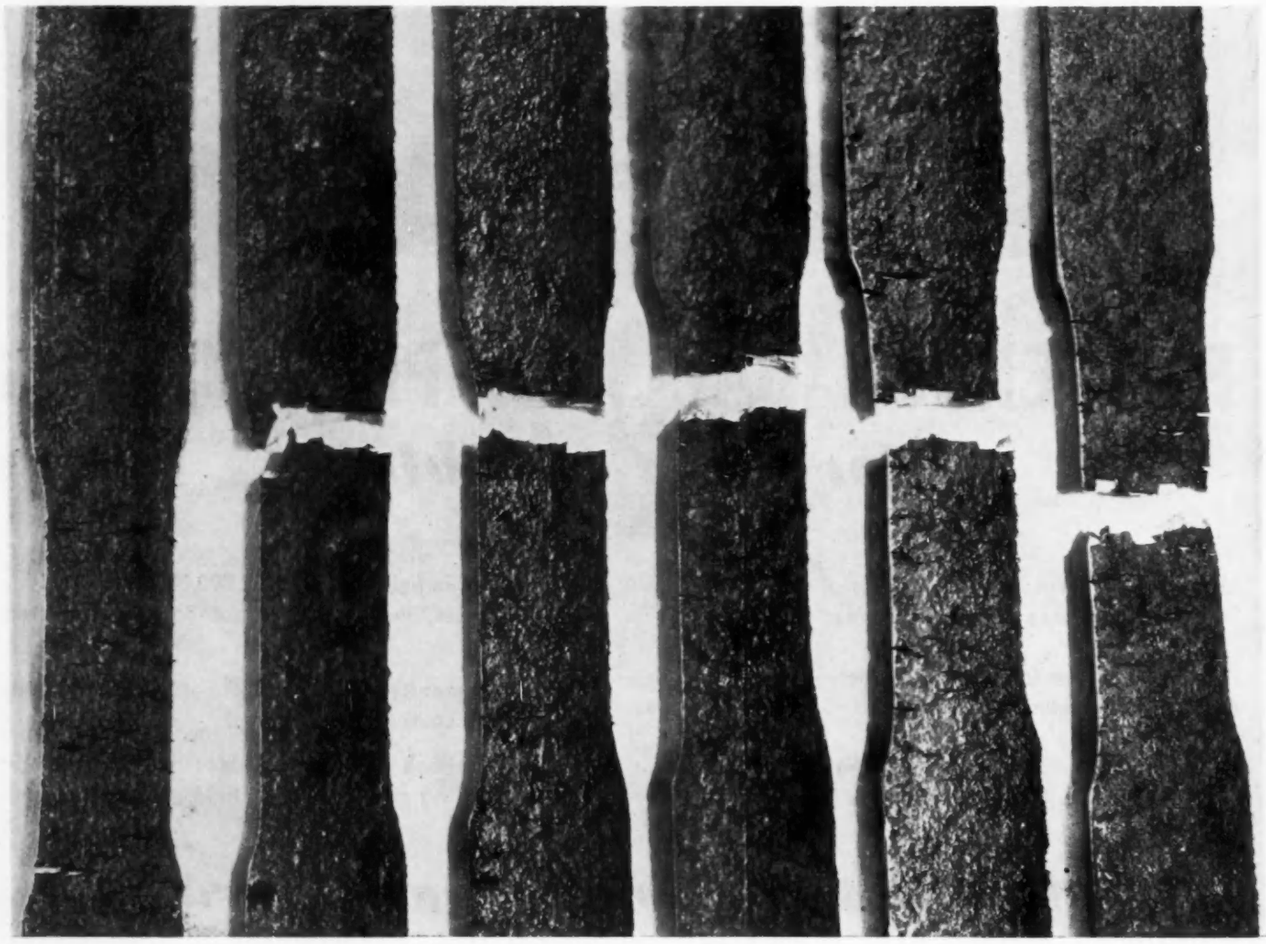
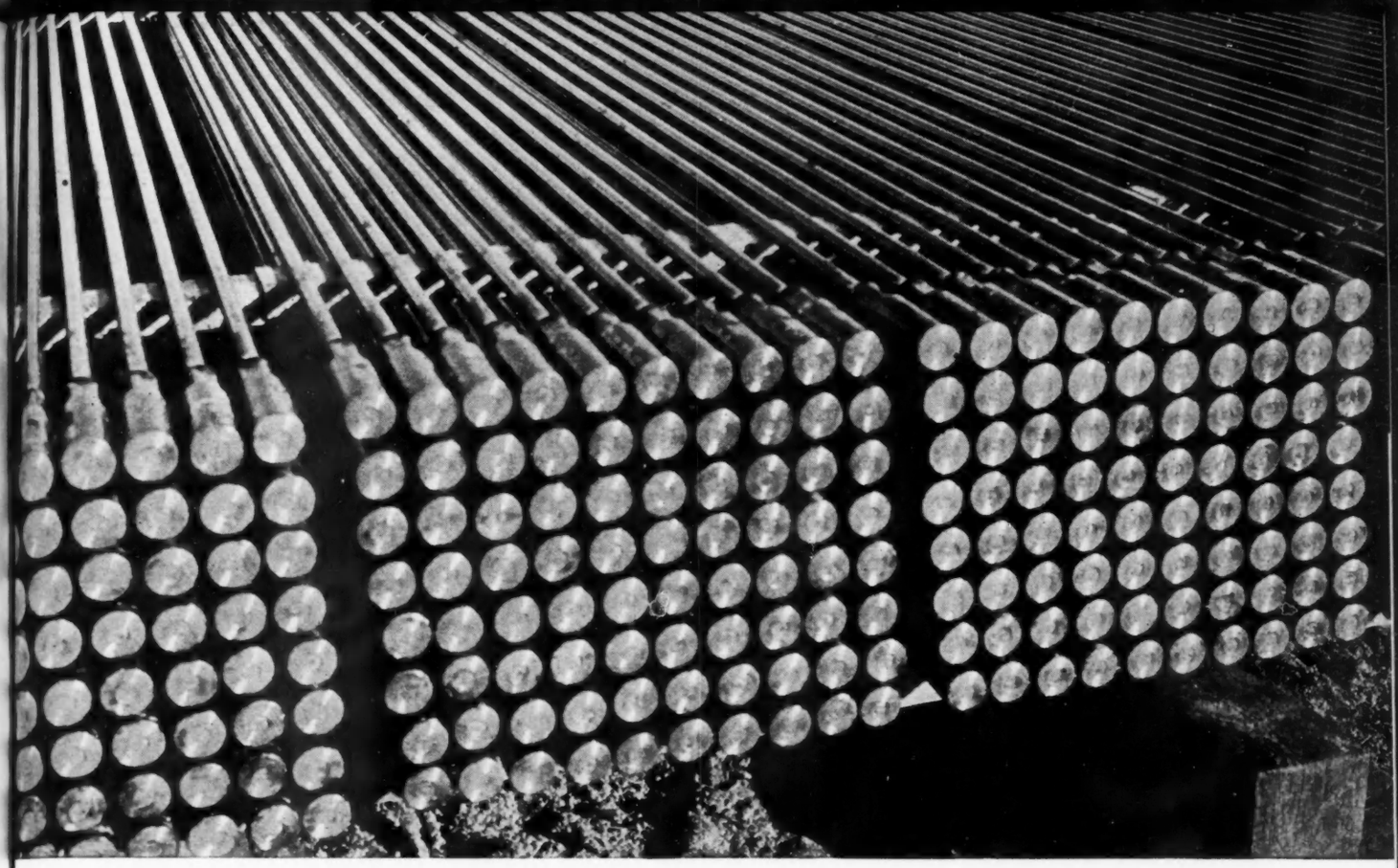


FIGURE 27
Opening of Corrosion-Fatigue Cracks under Tension Load.



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Their effects have been studied on sucker rods as well as on drill pipe, but nothing very definite ever has been learned, principally because the effect is only temporary.

Briefly, steel can be embrittled by adsorption of gas. It is as though the gas, hydrogen for example, becomes alloyed with the iron crystals, thus forming a very brittle alloy. It apparently occurs only when drill pipe is in exceptionally corrosive fluids, actually weak acids, but the theories involved need not be discussed here. Suffice it to say that, when removed from the embrittling agent, the steel gradually resumes its normal condition by giving off the gas which had been adsorbed. Heat, incidentally, hastens this process.

Whether much breakage truly can be attributed to hydrogen or hydrogen-sulfide embrittlement is a moot question, but it is interesting to note that for many years operators have believed that allowing drill pipe or sucker rods to "rest" in the open air decreases the tendency to breakage in corrosive areas. This is quite logical if we agree to the embrittlement theory by adsorption of gas.

7. Worn Pipe

Some drill-pipe troubles are almost too obvious to need mention, except to point out how certain operators handle the problem. Worn pipe is a good example.

If kept straight throughout its life, drill pipe can wear quite thin without showing any evidence thereof. This is especially true in deep fishtail or easy rock-bit drilling, where little weight is carried on the bit and, therefore, little or none of the pipe is in sufficient compression ever to bend it.

Formerly the wear on the tool joints was the determining factor. Inasmuch as in fishtail drilling there are relatively few fatigue or corrosion-fatigue failures, experience indicates that the pipe and tool joints wore about equally, so that when either was worn too thin it was not worthwhile replacing the other. Upwards of 150,000 feet of hole is not at all uncommon for drill strings in this type of service. Such strings were only laid down, or degraded into line pipe, when the tool-joint shoulders were so thin—in the opinion of the drilling superintendent or tool pusher—that they no longer would make a reliable seal; or when some few fatigue failures began to develop in the pipe.

Today, however, most operators make outside-diameter measurements from time to time, and throw out lengths which show diameter readings below a certain minimum. One large Gulf Coast operator, for example, sets this figure at 4.430 inches for 4½-inch drill pipe. A well-known drill-pipe inspection firm checks 4½-inch 16.60-pound pipe to 4.434 inches, and the 18.10-pound weight to 4.425 inches.

These outside-diameter checks for wear usually are made the first time the strings are brought in for general tool-joint repairs, at about 75,000 feet of drilling for average Gulf Coast work. Simple no-go gages are used, and checks are made at several points along each length and at several points around the circumference. The inspector uses some discretion, based on experience, and does not necessarily throw out every length over which the no-go gage will pass. What he really is looking for are spots of badly eccentric wear, most of which could be found by feeling with the hand.

Although it would seem that drill pipe always should wear concentrically, if always kept straight and if always run in tension, there are apparently exceptions to this rule, especially in high-speed rotation. In Turner Valley, Canada, for example, drill pipe is handled quite carefully, and is kept unusually straight; but, in spite of this, many lengths show very eccentric wear. It is particularly noticeable on the tool joints.

A possible explanation of this is that, at some critical speed, the pipe ceases to rotate around its own true axis, but takes on a sort of centrifugal "swing" which keeps one side of the pipe rubbing hard against the hole. At least this is the theory of one Canadian operator, and it is an interesting idea.

The average rotating speed in Turner Valley is from 150 rpm to 250 rpm, and occasionally as high as 450 rpm. Being definitely above the speeds in the Mid-Continent which apparently do not give eccentric wear, and definitely under the very high speeds now being used in California, it seems quite possible that there are critical speeds which cause uneven wear, or even crooking, under otherwise ideal conditions.

8. Crooked Pipe

Drill pipe can become crooked during transportation, in railroad cars, in unloading, in trucking, and even while pulling into the derrick or laying down for racking. This is particularly true of range 3 pipe, and is an objection to using this range. The remedy is obviously that of taking greater care in all handling operations.

It can become crooked in the well, by being made up with grief stems, drill collars, subs, or tool joints in which the taper joints are out of alignment, or even in which the pipe itself was threaded out of alignment. Here the trouble is a manufacturing fault, and the remedy is obvious.

Most often drill pipe becomes crooked in service at the bottom of the string, where insufficient drill collar is being used and where some of the drill pipe is run in compression. Again, the remedy is obvious.

If used in a crooked condition, even slightly crooked, the pipe is in danger of wearing thin on the convex side of the bow. In rock-bit or other abrasive formations this wear takes place quite rapidly, and breaks can occur readily.

More often, however, rotating crooked drill pipe sets up heavy bending stresses, and causes fatigue failures. This is true even in the case of but slightly bent lengths.

Another common cause of crooked drill pipe is careless handling while going into the hole. If the bit hits an obstruction, such as a slight bridge or heavy filter cake, it might be stopped suddenly enough to throw the whole string into compression. This undoubtedly would crook the bottom joints almost as though the string had been dropped to the bottom. Obviously this cause of crooking drill pipe can be avoided by watching the weight indicator quite closely while going into tight or cavey holes.

Careless tonging of taper joints can throw a short kink into the box end of drill pipe, just above the point where it sets in the rotary slips. Having the pipe set too high is particularly dangerous, but probably the most frequent cause of this trouble is the careless use of the automatic cathead in making up or breaking out the taper joints.

An absolute prevention of crooking by tonging would be to place a backup tong immediately under and parallel to the lead (or jerk) tong, and extending out on the same side of the tool joint. Then there would be no bending moment involved, only pure torque; but

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there is no easy way to rig up for this. Therefore, all that can be done is to exercise care in using the tongs so that the bending moment will be as small as possible.

Occasionally it has been found that drill pipe can become crooked in the upper part of otherwise perfectly normal drilling strings due to a "whipping" effect. This was noticed especially in the early days of the Oklahoma City field where some drilling was done inside of fairly long strings of large outside-diameter (13⅜-inch) surface casing.

Apparently there was nothing to stop the drill string from taking on such a large amplitude of vibration that the pipe just "threw" itself into a crook. Probably a mathematical study of this problem could indicate what critical depths and speeds cause this type of crooking, but it happens so seldom that no great thought ever has been expended on the subject.

Inasmuch as crooking, from any cause, is a prime cause of fatigue failures, it is very important to keep all elements of a drilling string in perfect alignment. Kellys, drill collars, subs, and their thread alignments can be checked with optical instruments; and the pipe itself, as it rolls on the rack, can be checked by a practiced eye.

Pipe which does not roll reasonably straight should be discarded or straightened at once. Many operators and contractors keep portable, hydraulic straighteners right at the rig, and use them to very good advantage. There can be no harm from straightening drill pipe a number of times, unless the kinks were so sharp that the pipe had been buckled even a small amount out-of-round.

Operators often try to straighten slightly crooked pipe by putting the lengths in the upper part of the string, where they will be under tension. Although seemingly they may straighten enough to give no trouble in the upper part of the string, they are not being straightened entirely, nor permanently, and are still a menace if later allowed to get down near the drill collar.

9. Collapsed Pipe

a. From Drill-Stem Tests

In carrying out various formation tests, drill pipe is run empty in the well and set into the formation being tested before the valve at the bottom is opened. This subjects the bottom lengths to the full hydrostatic pressure of the drilling fluid, and has been known to cause collapse.

b. From Accidentally Running Pipe Empty

A case has been recorded of 5-9/16-inch drill pipe having been run to 7200 feet with a float collar, but the driller forgot to fill with mud while going into the hole. The bottom several joints collapsed, and resulted in a bad fishing job.

Ordinarily new drill pipe will withstand the external pressures usually encountered even in very deep wells, but if old and worn pipe or, what is more likely, if the pipe has been battered out-of-round, its collapse strength is reduced greatly. In the rare cases of collapse investigated by the writers, only old pipe was involved. The natural recommendation, then, is that any drill pipe run near the bottom of empty strings should be fairly new pipe, and should be examined carefully for any visible damage or out-of-roundness.

c. Tong- or Slip-crushed Pipe

Tong- or slip-crushed pipe hardly could be called collapsed pipe, but sometimes it is so classified. The causes and preventive measures are too obvious to need comment.

10. Eccentric Wall Pipe

In all of the writers' decade and a half of experience with drill-pipe troubles, there has never been a case in any make of seamless drill pipe in which eccentricity of wall has been related definitely to a failure. Theoretically, of course, the strongest possible tubular section is one with perfectly uniform wall thickness, but the reduction in strength due to the allowable minimum of 12½ percent, or even more, under the nominal wall is only a very small factor as compared with other factors which cause drill pipe to fail. As an example, collapse tests made on pipe whose wall is carefully measured show no definite relation between eccentricity and collapse strength.

At least one large operating company, running its own drilling rigs, has a recorded case of trouble which it thought could be attributed to eccentricity. However, there were so many other factors involved that the true effect of the eccentricity was rather obscure.

11. Internal Erosion

Although there is a popular belief that mud can "erode" its way through drill pipe, without there being an original opening, there is no basis in fact for this theory. The idea is tied up with the word "washout" which, as stated earlier in this paper, is merely an eroded crack, which more properly should be called a "fatigue crack."

Drilling fluid, inside of drill pipe, does not have sufficient velocity to do any cutting, even in the restricted area under the tool joints, or upsets (in the case of internal-upset drill pipe). The fact that original mill scale can still be found in drill pipe, even after rather long service, is pretty good proof that the mud stream has very little cutting effect.

Below a critical velocity any fluid, especially a viscous one, moves in what is called "streamline" flow, in which the very center of the stream is moving fastest and with each succeeding "layer" of fluid moving less and less rapidly until at the inner surface of the conductor there is considered to be an infinitely thin layer having no velocity whatsoever. This theory, of course, would be true only for a tube of perfectly uniform inside diameter and with a perfectly smooth bore.

But, even with commercial drill pipe, the drilling mud follows "streamline" flow principles except, possibly, in very small pipe such as 3½-inch, or when the flow is through the tool joint and upset sections, in which cases the flow sometimes becomes turbulent.

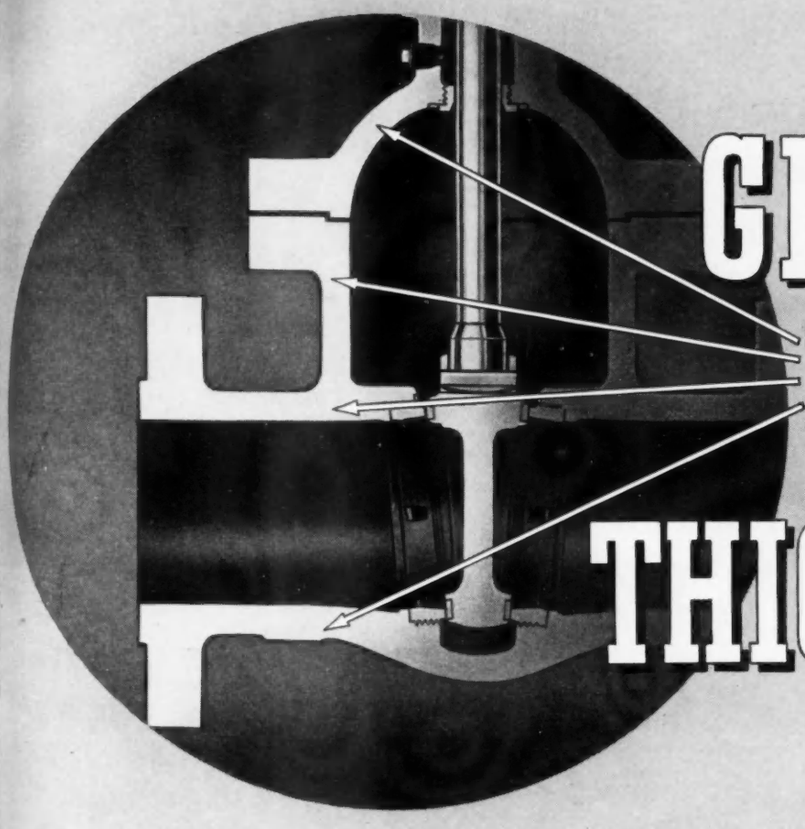
Water courses in bits, which are the smallest areas through which the fluid passes; and, with normal sand content in the mud, water courses do not cut appreciably with mud velocities around 100 feet per second and even higher. The maximum delivery through 4½-inch internal-upset drill pipe on the Gulf Coast approximates 500 to 600 gallons per minute, which gives maximum velocities of some 30 feet per second through the upsets, 27 feet per second through the tool-joint bores, and only 17 feet per second through the body of the pipe. Very evidently, then, there can be no possible cutting section with velocities so far below the approximate critical figure of 100 feet per second.

12. Magnetism

There has been much discussion from time to time concerning the significance of the magnetized condition of drill pipe. Nevertheless, to the best of anyone's knowledge, the magnetic condition has no effect whatsoever on the serviceability of the pipe.

[1] V. V. Mason, "Drill Pipe Corrosion," Am. Inst. Mining Met. Engrs., Los Angeles Meeting, Oct., 1941.

(To be continued.)



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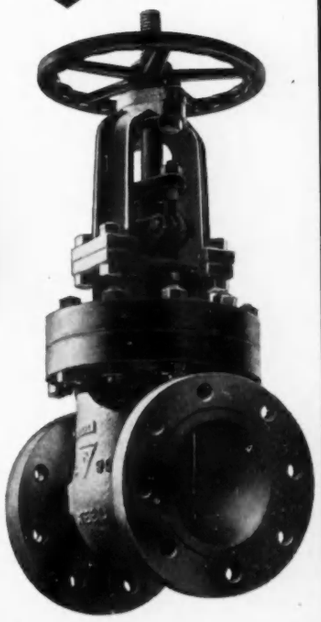
It is equally important that their renewable features enable you to continue them in service with the use of very small amounts of scarce and strategically important metals.

Fig. 3031 Cast Steel Swing Check Valve Disc hangs at 45°. Seats tight horizontally or vertically. Cast Carbon or Cast Alloy Steels. Flanged ends—plain or ring joint facing—or welding ends. Primary and intermediate ratings same as for Gate Valves.

Fig. 3011 Cast Steel Globe Valve Full plug seat and disc. Cast Carbon or Cast Alloy Steels. Flanged end—plain or ring joint facing—or welding ends. Primary and intermediate ratings for Globes 6 inches and under same as for Gate Valve.

Fig. 3001 Cast Steel Gate Valve Extra heavy, solid I-beam type wedge. Cast Carbon or Cast Alloy Steels. Flanged ends—plain or ring joint facing—or welding end. Rating in accordance with API specifications 600 A-39.



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AMERICAN CHAIN & CABLE COMPANY, Inc.

Oil Company Earnings for 1941 Likely to be Comparable with Those in Good Years, 1926, 1928, 1929, and 1937

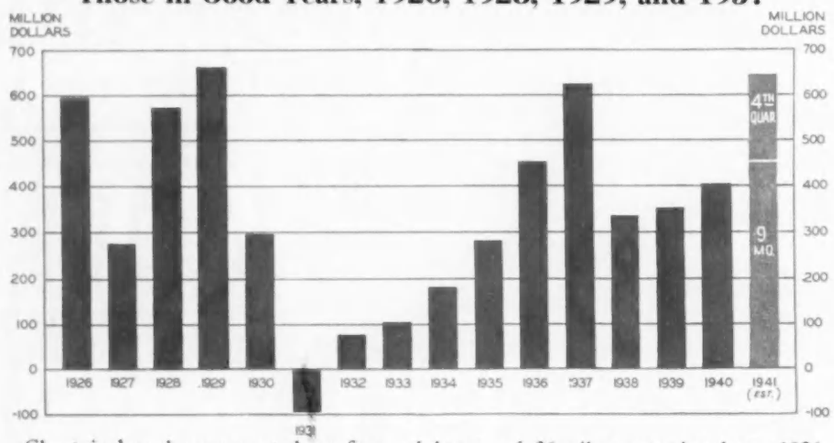

Chart is based on reported profits and losses of 36 oil companies from 1926 through 1940 and on indications for 1941 as discussed in accompanying text.

Earnings Favorable as Oil Use Expands While Prices Improve

THROUGH benefit of record-breaking demand for petroleum products and improved prices of crude oil and its derivatives, oil company earnings for 1941 promise to be closely comparable with those for 1937 and 1929, hitherto the most profitable years in the history of the industry.

As indicated on an accompanying chart, it appears that 1941 earnings may be somewhat better than those of 1937 and almost as good as those of 1929.

The charted estimate is based on actual results in the first 9 months for 22 companies that are well representative of the industry and on the assumption that earnings in the final quarter will be approximately the same as those in the third quarter, with volumes of business closely comparable and prices about the same or slightly better.

(Gasoline sales normally decrease somewhat in the fourth quarter, but the season brings at least partially compensating increases in sales of heating oils, kerosene, and heavy fuel oils and this year, there probably will be a less pronounced dropping off in gasoline business, as the third quarter had two months of curtailed deliveries to service stations on the East Coast, while the fourth quarter had less than a month of such curtailment before restrictions were lifted.)

For the first 9 months of 1941, the earnings of oil companies approached but did not equal the profits in the corresponding months of 1937. As shown in the accompanying table and one of the charts presented herewith, 22 companies in the aggregate earned 83.7 percent as much from January through September of 1941 as in those months of 1937. But results for 1941 became progressively better as the year advanced, and for the September quarter, the 22 companies earned 92.8 percent as much as in the corresponding period of 1937. For the fourth quarter of 1941, even better earnings than in the final period of 1937 are indicated, inasmuch as late 1937 brought the beginning of the business recession of 1937-1938 and a weakening of prices of gasoline and other petroleum products.

(In July, August, and September of 1937, regular grade gasoline at Oklahoma refineries was priced at 6.06, 6.06, and 5.91 cents a gallon, respectively, and for October, November, and December, the price declined to 5.69, 5.10, and 4.86 cents; while dealer's net price in 50 cities went from 10.51, 10.66, and 10.66 cents in July, August, and September, to 10.63, 10.58, and 10.30 cents in October, November and December. In contrast, gasoline prices slightly improved in July, August, and September, 1941, and they are holding steady in the final quarter.)

This year's record of earnings has been one of progressive improvement, in reflection of extraordinary demand for crude oil and refined products and resultant large volumes of business and also in reflection of improvement in prices of both crude and refined oils.

For the first quarter, earnings were about one fourth lower in 1941 than in 1940. In the second quarter, there was a year-to-year improvement of about one third, but for the first 6 months of 1941 as a whole, earnings did not quite equal those of the initial half of 1940. Improvement continued in the third quarter of this year, and as shown herewith, 22 companies, representative of the industry, earned more than twice as much as in the unsatisfactory September quarter of last year, when markets were weakening. Through benefit of the exceptionally good results in the third quarter, the 22 companies showed for the first 9 months of this year 36.8 percent more net income than in the corresponding months last year. For the fourth quarter, improvement over 1940 is even more pronounced, as earnings were exceptionally poor in the closing months of last year, because prices of gasoline and other products continued downward during

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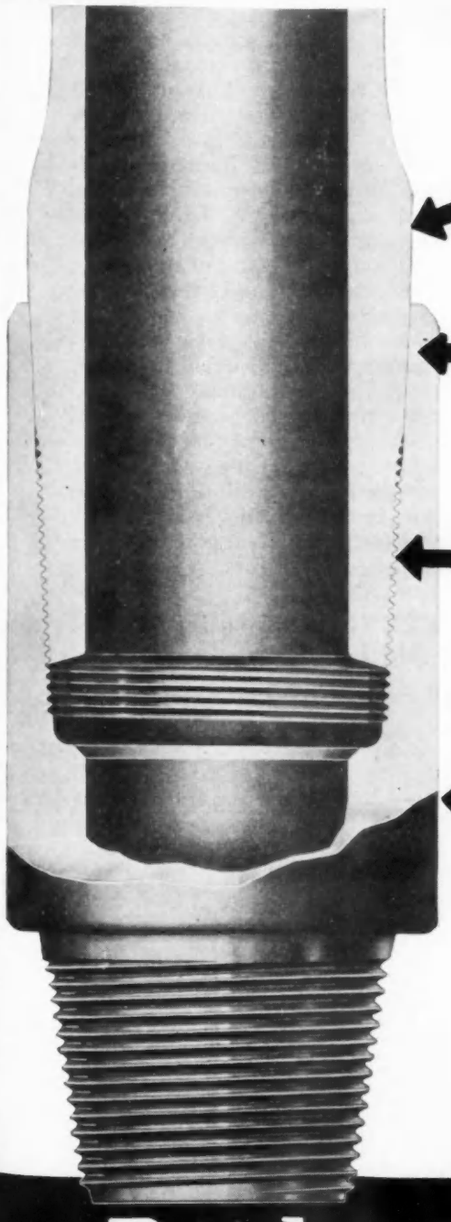

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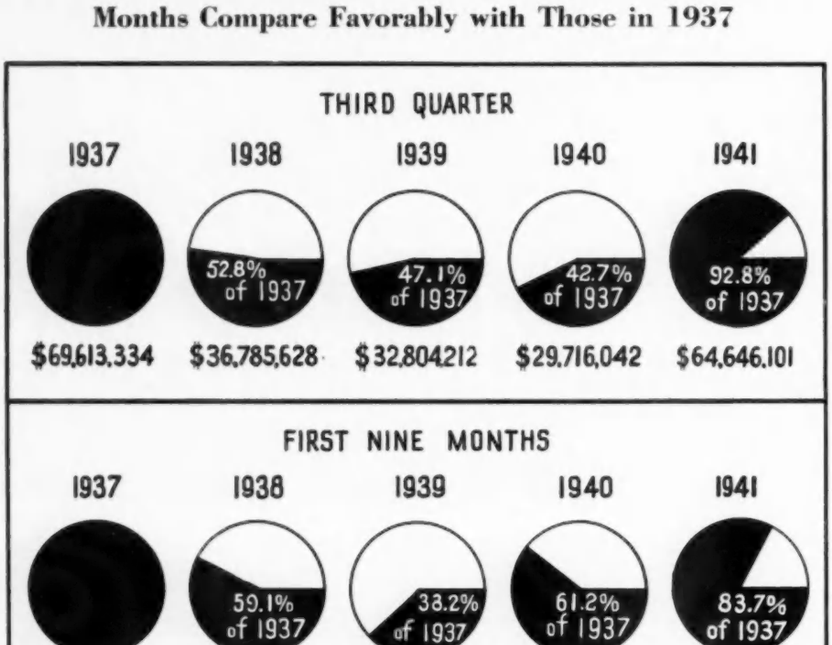
Profits of 22 Oil Companies for Third Quarter and First 9 Months Compare Favorably with Those in 1937



that period and did not rally until early 1941. The $149,418,352 earned by the 22 companies in the first 9 months of 1941 was 11 percent more than the $134,106,760 that they earned in the full year 1940.

In order to show how earnings of the industry in 1941 will compare with those in earlier years, there is included herewith the chart indicating actually reported aggregate profits from 1926 through 1940, inclusive, for 36 companies that constitute a large part of the industry; and the estimate for 1941 is based on results in the first 9 months for 22 representative companies and on fairly clear prospects for the final quarter. The 22 companies earned 11.4 percent more in the first 9 months of 1941 than in the whole year 1940, and if the 36 companies did equally as well, their aggregate net income for the first 9 months was as shown on the chart. The 22 companies, moreover, earned 43.3 percent of their 9 months' profit in the third quarter, and it is here assumed that the 36 companies had a similar experience. Finally, it is assumed that such third quarter earnings for the 36 companies will be approximately duplicated in the fourth quarter, as shown on the chart.

The charted estimate for 1941 will prove correct, therefore, only in so far as results for the industry as a whole conform with those of the 22 companies and in so far as the fourth quarter brings a repetition of third quarter earnings.

For the immediate future, there is in prospect a continuation of favorable earnings for oil companies, as further expansion of volumes of business is indicated, while prices of crude and products are strong and would improve if allowed by the government to do so. However, favorable demand and prices are partially offset by higher taxes, increased costs of materials, and larger wages and salaries; and unless the government henceforth permits higher oil prices in compensation for additional increases of costs in the industry, earnings must diminish; although men of the industry contend that favorable prices are especially essential now, in order to keep oil field discoveries abreast of the heavy withdrawals that are being made from established reservoirs.

September Quarter Brings Further Improvement in Earnings, and 22 Oil Companies Report One Third More Profit for First 9 Months Than They Did Last Year

After all deductions, including interest, depreciation, depletion, amortization, federal taxes, minority interest, etc.

COMPANY	QUARTER ENDED SEPTEMBER 30						FIRST NINE MONTHS					
	1937	1938	1939	1940	1941	Percent Change 1940-1941	1937	1938	1939	1940	1941	Percent Change 1940-1941
Amerada Corp.	$ 603,773	$ 473,825	$ 108,636	$ 439,513	$ 717,625	+ 63.3	$ 1,673,880	$ 1,356,886	$ 783,625	$ 1,324,877	$ 1,817,911	+ 37.2
Atlantic Refining Co.	4,049,244	1,068,673	1,774,539	1,295,628	[4]4,103,110	+ 216.7	7,486,000	3,930,407	3,124,448	6,560,394	9,164,653	+ 39.7
Barnsdall Oil Corp.	[3]976,364	912,290	204,427	[2]560,609	[3]3,143,880	+ 460.8	[3]2,232,694	2,602,329	1,262,466	1,650,737	4,453,985	+ 169.8
Continental Oil Co.	3,730,045	2,706,698	1,528,562	911,345	4,733,138	+ 419.4	11,614,575	5,793,406	4,065,842	3,299,631	8,590,802	+ 160.3
Houston Oil Co. & Houston P. L. Co.	328,411	[1]449,923	91,459	63,129	204,340	+ 223.7	1,253,824	[1]1,296,371	618,967	637,738	885,571	+ 38.9
Lion Oil Refining Co.	489,004	389,532	165,760	598,662	[2]304,726	— 49.1	[1]1,020,268	[1]984,688	[1]380,938	[1]977,538	745,063	— 23.8
Ohio Oil Co.	3,592,654	1,252,346	262,971	2,495,494	[2]3,027,473	+ 21.3	10,315,011	3,935,862	120,412	7,153,891	7,804,288	+ 9.1
Panhandle Producing & Refining Co.	[1]91,211	[1]27,566	*2,739	*21,604	110,977	.....	[1]227,887	[1]43,820	[1]6,861	*38,490	200,811	.....
Phillips Petroleum Co.	7,134,638	3,886,816	1,704,988	2,400,335	4,325,918	+ 80.2	19,813,719	9,471,956	5,479,057	8,778,533	12,562,598	+ 43.1
Plymouth Oil Co.	750,974	665,886	500,662	232,368	387,747	+ 66.9	2,113,970	1,994,006	1,673,366	1,231,188	1,015,924	— 17.5
Quaker State Oil Refining Corp.	172,731	572,283	536,757	85,686	591,607	+ 590.4	1,052,291	413,904	1,091,547	244,931	1,508,454	+ 515.9
Seaboard Oil Co. of Deleware	552,164	466,422	384,157	129,367	296,427	+ 129.1	1,782,382	1,360,308	1,169,588	891,859	878,023	— 1.6
Shell Union Oil Corp.	7,503,291	3,534,066	4,548,236	3,165,000	6,656,000	+ 110.3	15,984,218	9,364,493	6,710,658	12,615,195	14,486,000	+ 14.8
Skelly Oil Co.	1,911,022	695,180	609,327	706,943	1,358,149	+ 92.1	5,346,940	1,973,422	1,366,245	2,251,905	4,027,895	+ 78.9
Standard Oil Co. of California	13,355,627	8,480,446	5,523,295	6,360,675	11,843,132	+ 86.2	31,135,817	23,893,880	12,640,899	16,730,170	24,613,199	+ 47.1
Sunray Oil Corp.	302,430	105,932	68,637	70,782	317,758	+ 348.9	844,490	532,586	418,050	323,002	623,486	+ 93.0
Superior Oil Corp.	171,418	97,872	*30,184	48,073	26,796	— 44.3	314,197	292,817	21,684	125,056	[4]144,821	+ 15.8
Texas Pacific Coal & Oil Co.	[1]260,042	[1]279,794	[1]201,990	[1]55,286	300,626	+ 443.8	[1]715,548	[1]780,542	[1]617,802	[1]348,126	770,131	+ 121.2
The Texas Corp.	15,500,000	6,750,000	10,500,000	7,692,712	16,656,065	+ 116.5	42,500,000	20,500,000	17,500,000	33,692,712	40,063,433	+ 18.9
Tide Water Associated Oil Co.	4,474,733	2,424,200	2,048,908	1,152,760	[3]3,543,348	+ 207.4	12,171,435	8,416,905	4,380,318	7,057,625	9,790,595	+ 38.7
Union Oil Co. of California	3,650,000	1,450,000	1,898,569	1,198,232	1,911,682	+ 59.5	8,850,000	6,400,000	4,549,713	3,212,612	5,087,577	+ 58.4
H. F. Wilcox Oil & Gas Co.	13,558	95,878	109,409	31,839	[2]95,577	+ 200.2	75,241	229,279	290,468	72,771	183,132	+ 151.7
Total for 22 Companies	69,613,334	36,785,628	32,804,212	29,716,042	64,646,101	+ 117.5	178,524,387	105,567,867	68,272,954	109,218,981	149,418,352	+ 36.8
Percent of 1937	100.0	52.8	47.1	42.7	92.8	.....	100.0	59.1	38.2	61.2	83.7	.....

* Loss. [1] Before Federal Income Taxes. [2] Based on comparison of Company's second quarter and third quarter reports. [3] Includes non-recurring profits of $250,000 from sale of property. [4] Compiled from Company's quarterly reports.

Air-Gas Proves Good Stripper Area Recovery Agent

By F. R. COZZENS, Equity Oil & Gas Company

Mixing air with gas has other advantages in addition to lowering cost of cycling operation

THE forcing of natural gas through a sand body depleted of its original supply, has long been an outstanding method of oil recovery. Unfortunately, however, more than 70 percent of the eastern stripper-field producers are located in areas where gas must be piped in from outside sources, the cost of this and various other factors making its use prohibitive as a recovery measure. Many producers in such areas have been experimenting during the past five years with air and gas combined. In summarizing results thus obtained, ample proof is found that when an air-gas ratio not lower than 3 to 1 (three parts air, one part gas) is maintained, the producer gets full benefits of air pressure plus a reconditioning of the sandy body resulting from the use of gas. Cost is 40 to 60 percent less than when gas is used alone, which places the method within the economic range of small operators.

Air-Gas Method

The air-gas method differs but slightly from regular air-pressuring except that gas in required amounts is fed through a jet to the intake of an air compressor, and that traps are placed on the producing wells so that the air-gas mixture can be saved for reuse. On small leases, regular oil storage tanks are used for air-gas storage. There is no set rule which determines the amount of gas fed to the air under pressure. The richer the mixture, the more speedy is its effect on the sand body; but cost of gas and its limitations must be reckoned with, so the average producer generally adheres to the 3 to 1 ratio.

When an air-gas mixture is forced into an induction well, the pressure gradually built up against the sand body starts fluid moving in various directions from that point. The infusion of gas has a softening effect on the sand, counteracting the crystallizing action of air alone, and there is far less tendency for paraffin to form. There is also a stimulating effect upon the fluid, since natural gas tends to thin and enliven oil, hastening its passage through sand channels, and eliminating considerable sludge. The air itself, however, is the principal means of forcing the oil along its course.

Trap Air-Gas Mixture

Fluid thus forced into range of a producing well is pumped out in the regular manner, but the air-gas mixture which arrives with it is caught in a trap line at the casing head, and passes into storage. From this storage it is conveyed to the compressor and inducted back again into the wells. Waste of the air-gas mixture on its circuit depends largely upon the condition of the sand and the efficiency of the operator's equipment, but it can be readily understood that in reinduction into the wells less gas is required from outside sources to hold a given ratio. Some operators take advantage of this fact to enrich the mixture. Pressure at the casinghead of induction wells generally ranges between 100 to 250 pounds. As a rule, compressors are operated day and night to build up and hold the pressure as uniform as possible. When a producing well "blows out," that is, when fluid is replaced entirely by air-gas, the pumping equipment is removed and that particular well is sealed. Later on, many of the sealed wells are made into induction wells, so that the course of pressure can be alternated. In this manner, an oil sand can be pressured in various directions, thus draining pools which may have accumulated in isolated portions of the sand. The practice also prevents a too rapid forming of air channels.

Improves Oil Quality

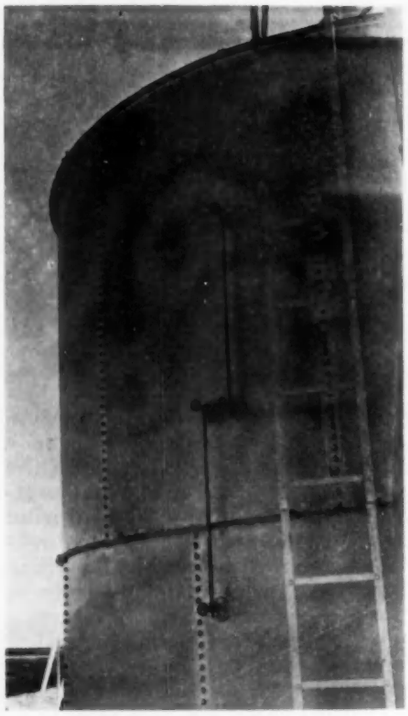
Where air-gas pressure has been maintained over a period of weeks there is a marked improvement in the quality of oil produced, and the quantity is increased, due to the fact that induction of gas has rendered the sand more responsive to pressure. As a secondary effect, gas tends to prevent the accumulating of wax and paraffin, and aids in breaking down salt, sulphur, and oxide formations which are often caused in the sand by various other recovery measures. Such action gradually brings the sand back into a more virgin state, and so lengthens the life of producing wells.

Cost of the air-gas method (except the purchase of gas) seldom exceeds $10 per well over that of straight air-pressuring. Much of the necessary equipment can be arranged from materials already available on the lease. Tests made in several pay sands over a typical cross-section of stripper oil territory show beneficial results in more than 85 percent of the wells, and in some cases, air-gas induction proved successful where other recovery methods had failed.

Practical Operating Hints for

1. GAUGING

Dual Gauge Glasses Check Tank Contents



Staggered gauge glasses permit cleaning or replacement; reduce loss possibility.

GLASS tubes serving as fluid-level gauges on gunbarrels allow visual indication of water-oil contact and offer additional advantages for efficient gunbarrel operation. One producer in South Texas places such gauges on all new gunbarrels before erection, with supports for the tubes bolted and gasketed to sides of the gunbarrel at the desired height. Each gunbarrel is equipped with separate gauges, each being 32 inches long and arranged to give effective gauging for twice their length.

Top of the upper gauge is placed several inches above level of the overflow to the stock tanks, so that in the top few inches, there is always an air space which is easily observed by the switcher at a glance. Hence, if the overflow is not working, either due to mechanical failure or failure to open the overflow valve, the gauge fills with fluid and is readily observed before the gunbarrel itself overflows.

Water level in the tanks is also easily ascertained, permitting planning in advance for its drainage. Presence and volume of basic sediment in the gunbarrel is also observed before its overflow into the tanks, and represents saving of considerable time and expense in anticipating its disposal at proper time by not allowing it to enter tanks.

Use of dual glasses saves on replacement in case of breakage and also simplifies cleaning operation in case of stoppage or discoloration by oil or sludge.

2. STRIPPER WELLS

Portable Lease Tank Aids Well Checking

PROFITABLE operation of stripper well leases is dependent to a large degree upon careful and frequent gauging of individual well output. This importance cannot be over-emphasized in the case of wells with daily production less than 10 barrels, for should the production fall off even a few barrels, due to some mechanical failure or sanding up of the pump, the resulting loss in production would represent a substantial percentage. The time to service is when production starts to decline at a rate calculated to be greater than the normal decline curve would indicate. The only practical means of detecting such drops is to maintain a continuous schedule of gauging.

Since production from such stripper wells seldom warrants the expenditure of individual gauge tanks, the lead lines usually are brought together to a centralized tank battery in the center of the lease. With this type of set-up it ordinarily is difficult to ascertain the exact rate of production from each well.

One company operating a shallow stripper-well lease in the San Joaquin Valley of California, takes a gauge on each well at regular intervals with the aid of a small portable 20- to 25-barrel tank. This unit is towed to the well and production turned into the tank for the length of time necessary to obtain an accurate gauge of the rate of production.

A swing pipe is connected to the bottom outlet of the tank so that the oil collected can be brought back to the tank battery and unloaded. In order to facilitate the

Mounted on auto chassis and provided with swing discharge pipe, this tank permits gauged production of stripper wells as check against undue drop.

THE PRODUCTION MAN . . .

unloading of the oil, a connection is welded into the top of the large flow line leading down a slope to the shipping tanks. This consists of a container made up from a short section of large diameter light well casing directly connected to a swing which in turn empties into the flow line. This arrangement makes it easy to swing the container over to the tank unloading spout. The two-inch pipe making up the swing connections also contains a check valve near the lower end, making it impossible for oil in the main line to back up into the unloading container.

3. COMPRESSOR

Extension on Power Provides Extra Drive

A NORTH TEXAS operator desired to set a compressor and operate it in tandem with the pumping power, the compressor to furnish pressure for the repressuring project on the lease.

Without completely revising the original setting of the rod-line network, the only available spot for the compressor was directly in front of the engine and but a short distance from the radiator and starting crank circle.

To provide drive for the compressor a short shaft was flexibly coupled to the end of the power pinion shaft and carried to a second bearing beyond the compressor foundation. In this location a Vee-belt could connect shaft and compressor without fouling any rod line.

Cooling water circulation for the compressor was obtained from a centrifugal pump, mounted on a small foundation in line with the Vee-belt drive, the outermost groove of the drive pulley carrying the single belt for the water pump.—*Ty Davison, Wichita Falls, Texas.*

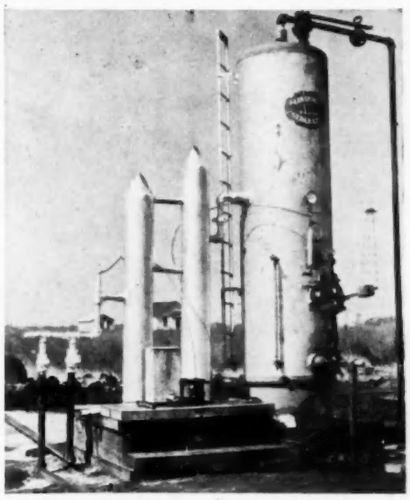
4. SAND CONTROL

Knockout Cylinders Improve Oil Quality

IN OIL fields where quantities of sand are produced with oil from the wells, the sand is often deposited in the separators to such extent that their efficient operation becomes an impossibility, and troublesome cleanout jobs are required to prevent separators from becoming completely clogged.

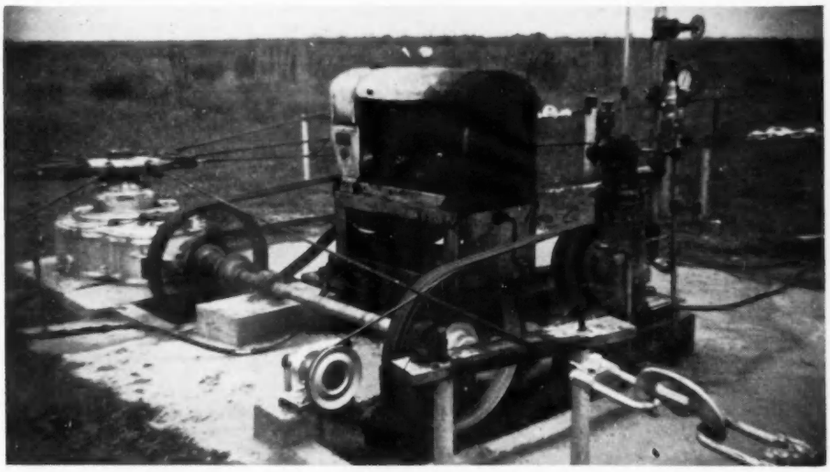
A Gulf Coast operator having production containing a small percentage of sand uses a special knockout device to remove as much sand as possible prior to entrance of fluid into the separator. The apparatus consists of two vertical chambers a short distance from separator, designed to allow accumulation of fluids, with overflow pipes directing flow from top of cylinders into the separator. Retarding movement of fluid in passage through the cylinders affords the heavier sand an opportunity to settle to the bottom. Accumulated sand is drained at intervals by means of a drain leading to a nearby pit.

The sand knockouts are of 10-inch pipe, the first receiving the fluid being 6 feet in working height while the second is approximately



Twin chambers, connected in series to oil flow, insure sand settling and removal.

7 feet. A 2-inch flowline from the well empties fluid into the first cylinder at a point near its center. Two-inch overflow pipes are placed in position to transfer all fluid above the desired level into the adjacent cylinder, which is similarly arranged with its overflow conducted into the separator. Small tubes joined with a chemical injector are attached to the main flowline pipe before its juncture with shakeout, with small amounts of chemicals added to the flow to facilitate separation of sand, most of which is retained in the first cylinder, although excessive sand overflows into the second chamber.



Extension shaft, connected to original power drive through universal, takes drive across engine to compressor and water pump pulleys for Vee-belt operation.

THE practical operating hints for the drilling rig and production man, appearing in these features each week, are secured from oil fields everywhere and offer suggestions that will help to improve field efficiency and safety. The items give an excellent picture of the remarkable ingenuity being exercised by the operating divisions of the industry. Contributions to these features will be paid for at the rate of $5 for each illustrated item accepted. Address contributions to "The Editor, THE OIL WEEKLY, Houston."

It's An Important Job Moving Oil Thru Pi

FEW OF HUNDREDS OF STATIONS..

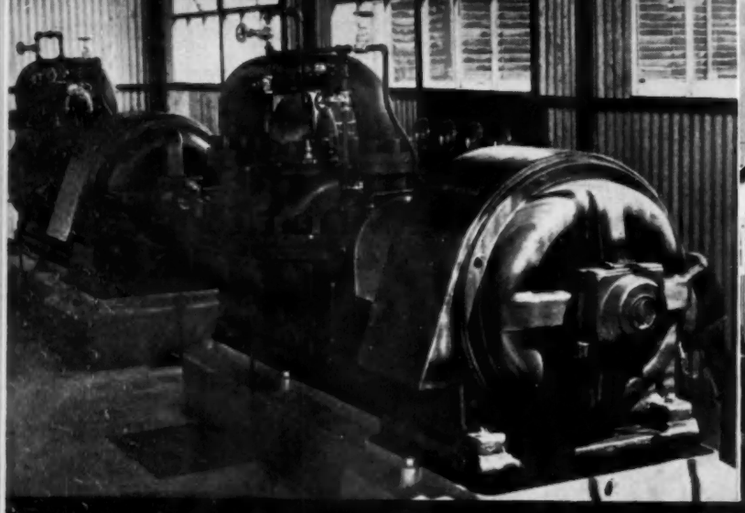
GATHERING STATION, POWERED BY UTILITY ELECTRIC POWER
SHAWNEE, OKLAHOMA

● POWER for moving the world's most precious products—oil and gasoline—presents a problem of vital importance to every pipe line operator as construction of thousands of miles of new pipe line nears completion this year!

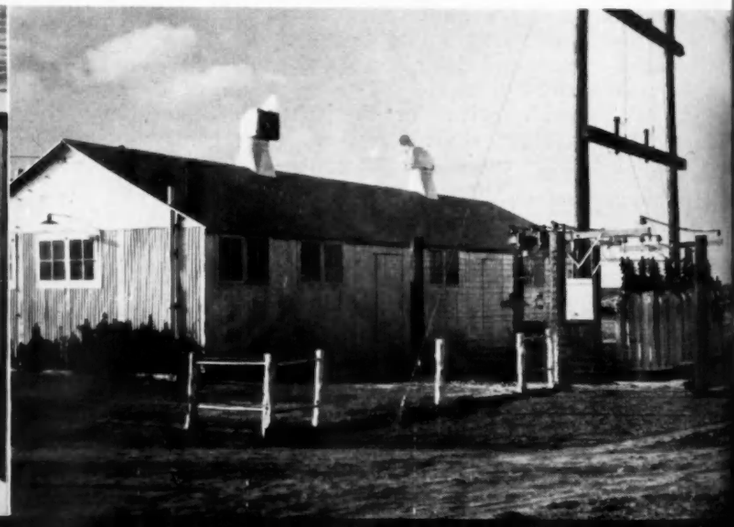
Our government needs petroleum—and plenty of it—for defense. But most important of all, the government wants to be assured that adequate facilities are available and ready for moving its requirements of petroleum products during any emergency.

We can speak with authority on the subject of Electric Power, for in all areas where there is oil activity, Utility Electric Power Companies have developed and extended their services to more than meet existing power requirements.

As a result, pipe line operators using Utility Electric Power not only have been benefited handsomely from the immediate



INTERIOR OF PUMP STATION SHOWING ELECTRICALLY DRIVEN GASOLINE PUMPS



TRUNK LINE PUMPING STATION, POWERED BY UTILITY ELECTRIC POWER
MEEKER, OKLAHOMA

The Petroleum Electric Power Association is the outgrowth of a desire on the part of electric power companies to render greater service, through cooperative effort, to the Petroleum Industry.

PROFIT!
Utilities
ELECTRIC POWER

Job . . . A Vital Task . . . This Pipe Lines For Defense . . . !

. . POWERED BY UTILITY ELECTRIC POWER

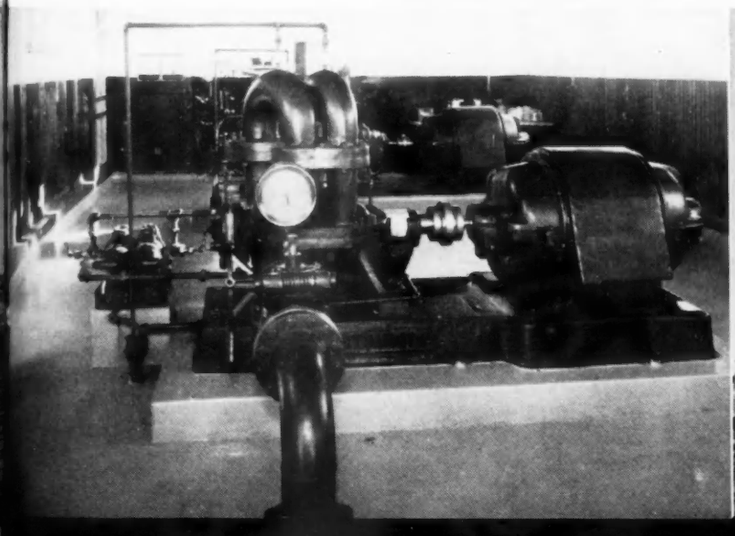
advantages of this efficient, low cost power, but now are in a position to take on increased load demands without much additional cost for electric power equipment. In most cases, it will not be necessary at all to install new equipment to increase the output.

The foregoing is possible because Utility Electric Power Companies have anticipated with accuracy the job to be done; both for the present and the future. Our biggest job now is to see that our high standard of service to you is maintained so there will be no obstacle in the delivery of petroleum products to the government for defense.

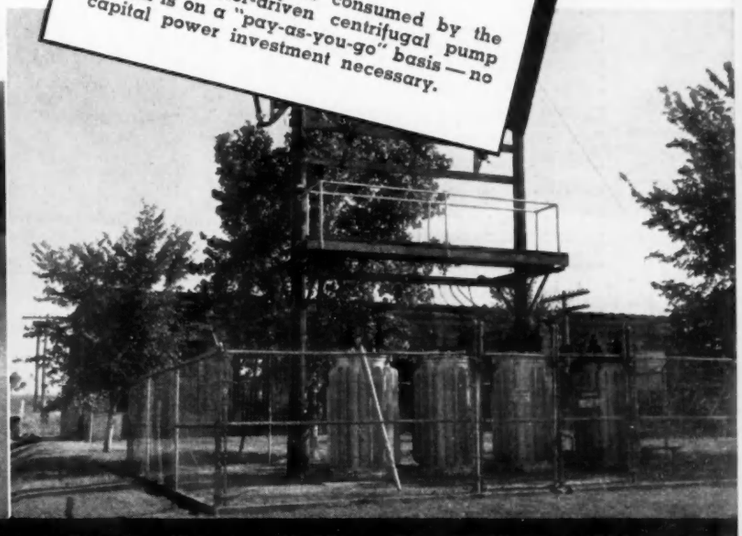
Your nearest electric power company is eager to assist you in every way possible. Just call on them — consult the sales engineer — and learn how to get the best power service at the lowest power cost.

ADVANTAGES

1. The induction motor-driven centrifugal pump (3600 R.P.M.) station can be installed for about 40% of the cost of any other prime mover type of pump station.
2. Maintenance cost is about 1/20 that of any other type of pump station.
3. Operating labor cost is only 1/3 that of any other type of pump station.
4. The salvage value of the induction motor centrifugal pump station may approach 75% of the original cost, at most any period of its life, whereas in other types of pump stations the salvage value will not exceed 50% of the original cost.
5. The electric power consumed by the induction motor-driven centrifugal pump station is on a "pay-as-you-go" basis — no capital power investment necessary.



CENTRIFUGAL TYPE PUMP, POWERED BY UTILITY ELECTRIC POWER



PIPELINE STATION, POWERED BY UTILITY ELECTRIC POWER
GOLDSMITH POOL, TEXAS

Use Utility Electric Power!

PETROLEUM ELECTRIC POWER ASSOCIATION

Box 1498, Oklahoma City, Oklahoma

Practical Operating Hints for

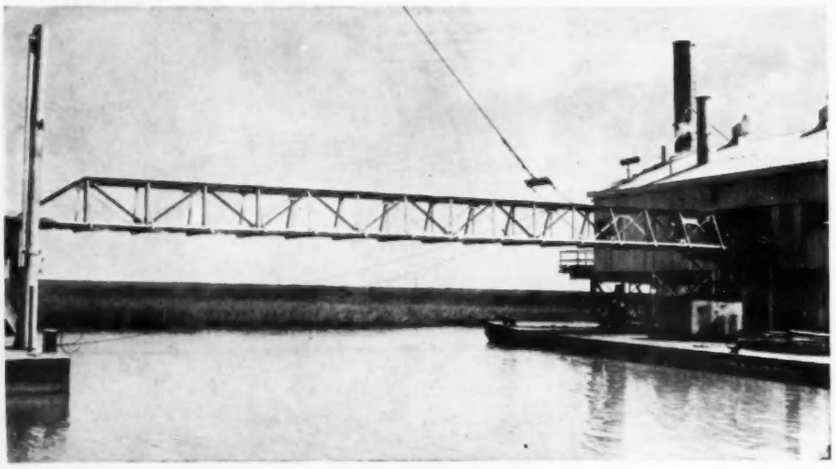
1. ACCESS

Drawbridge Connects Rig and Power Units

ON MARINE operations where drilling barges are used, it is usual practice to construct a bridge between the drilling and boiler barges to facilitate movement between the two structures and to support steam and water lines. A drawbridge may be erected which saves considerable time when changing locations, as the bridge is easily raised after loosening a few connections, and moved as part of the drilling barge. This eliminates dismantling the bridge either partially or wholly, and saves time and expense incurred in moving it as a separate unit.

The drawbridge is of all-steel construction, approximately 100 feet long, with walkway four feet wide and a guard railing four feet high, additional width being provided by brackets or arms to support steam and water lines. The end nearest the drilling barge is attached to the barge by hinged connections, and the other end is bolted securely to the boiler barge during drilling operations. All pipes across the gap are connected by unions to proper fittings on each barge.

Near the boiler barge end connection is made with a cable which runs through block at top of derrick and down to floor where it is fastened at a convenient place. When necessary to move the barges, unions joining the pipes are disconnected and the pipes either removed from the bridge or clamped securely to it. After the bolts are removed from the end tied to the boiler barge, the cable is pulled in by means of the cathead and the bridge lifted, with the hinged end serving as pivot. The drilling barge is then moved to next location, carrying the elevated bridge like a crane. By reverse process, it is easily lowered into position for connection with boiler barge at new location.



Hinged at the rig end, and provided with bridle and fall for ease in lifting, this bridge permits freeing of waterway and absorbs tidal fluctuations.

2. CONTROL

Boomers and Chains Anchor Preventers

FINDING that the sustained vibration during the drilling of a deep well sometimes results in failure of the threads in the turnbuckles used to support the blowout preventer assembly against the whiping action of the rotating drill pipe assembly, one contractor replaced the eye bolts and turnbuckles with load-binder chains and boomers.

Use of the chains, set under initial tension by the tightening action of the boomer, interposes a long series of slightly elastic links between the blowout preventer assembly and the four foundation posts of the substructure used as anchorages.

The slight give of the chain absorbs much of the vibration in the assembly, yet provides sufficient resistance to restrain the unit from whipping or tending to move out of line under sudden changes in load on the drill pipe column.

Gradual weakening of the chain and eventual failure may be checked through slack occurring in system under service stresses.

Chains, tightened with boomers instead of usual turnbuckles, provide necessary flexibility in maintaining B.O.P. alignment under rotary.

THE DRILLING RIG...

3. LIGHTING

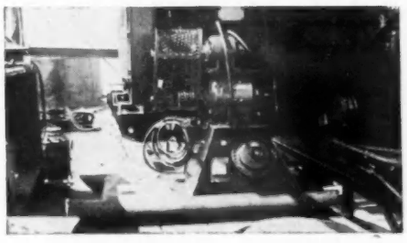
Unitized Generator Serves Rig Needs

A CONVENIENT and effective rig lighting set has been worked out by Clay Drilling Company and is in use near Sundown, Texas, in the Slaughter field.

The unit is powered by the internal combustion drilling engines, and is driven through conventional vee-belt drive from a pulley on the drilling engine crankshaft extension.

The unit, consisting of generator and exciter, is mounted on a skid base, the lower portion housing the rheostat and current controls.

The lighting-set skid is placed on the derrick floor adjacent to the flywheel end of the engine, and aligned by means of two turnbuckles and



Skid-mounted electrical unit is arranged to be driven by Vee-belts from engine.

struts, it being necessary only to slack off on one of these to remove or change vee-belts or to disengage the unit from its power source.

A formed guard of expanded metal fits over the vee-belt drive between generator and exciter and also protects the exposed end of the drive.

4. PROTECTION

Adjustable Auto Visor Saves Driller's Eyes

ORDINARY shades, set closely enough to his stand to protect the driller from excessive sunlight, tend to reduce the field of vision and even to block off clear view of the crown block and upper reaches of the traveling block, adding to the hazards of operating and slowing down the task of running pipe.

To afford the driller the eye protection necessary and at the same time enable the space over his head to be cleared instantly, one company

Universal mounting to this shade permits it to intercept sun without blocking view.

uses a standard automobile type visor, mounted on a long arm to give greater adjustability than would be available with the usual short bracket.

By means of ball and socket joints, the driller may adjust the visor and be enabled to watch both the block and the man on the fourble board.

5. SAFETY

Steam-Fed Standing Heats Driller's Post

DUTIES of the driller, stationed at the brake during cold weather, are less tedious when his feet are warm. A raised platform, fitted closely around the brake and clutch pedals and covering a steam coil, adds materially to his comfort. Signal Oil Company employs an arrangement with part of the coil beneath the platform and partly behind the brake lever. It is made of 1-inch pipe, with 2-inch header.

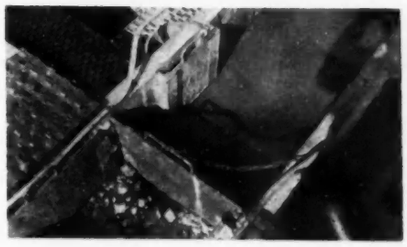
6. MUD HANDLING

Drop Gates Shift Flow Into Proper Channels

WHEN changing drilling mud for any reason, a quick and complete shift may be made through a dump arrangement installed in the steel flume from the service pipe.

At the shale shaker inlet steel gates, provided with chains to prevent misplacing, are installed so that they may be quickly manipulated. The flume is normally used for straight-through flow, the door at the side, communicating with the discard pit through a short pipe run, being kept closed.

By opening the side outlet, and closing the main gate to the shale shakers, the mud is diverted from one side of the pit, while the other



Pivoted gates at tie-ins in mud ditch aid in salvaging stock when dump is needed.

is being emptied without loss of drilling time or of circulation. Close check on the amount of mud being pumped, together with actual volume removable from the pit, permits the work to be carried on at normal speed, the new stock of mud being ready to be switched to the pumps.

L-shaped coil of pipe, tied to steam line for heating, is covered with plank flooring to provide warm and dry footing for driller while on tour.

THE FLYING CANNON!

With a 37mm. cannon protruding from its propeller hub, with machine guns bristling in its wings, this deadly Airacobra pursuit plane is one of the most effective weapons of the Army Air Corps.

These deadly fighters are being built by the Bell Aircraft Corporation, Buffalo, N. Y. In test flights, for the safe lubrication of the Airacobras' 1150 hp Allison engines, the Bell Aircraft Corporation relies on Sinclair Pennsylvania Motor Oil.

From the great Sinclair refineries come not only this "Airacobra tested" motor oil but 142 specialized types of lubricants for transportation and industrial uses. Sinclair brands also include a complete line of gasolines, fuel oils and other petroleum products for various uses.

SINCLAIR

REFINING COMPANY (Inc.)

630 Fifth Avenue, New York, N. Y.

HIGHLIGHTS IN THE WEEK'S NEWS

Transport

Standard Tankers on West Coast Improve Efficiency

Following studies of shore practices, Standard Oil Company of California has made several changes and adopted methods which improve efficiency of its tankers on the West Coast. To improve discharge rates the company is installing in three 16,000-ton tankers pumps which will raise their discharge time from 7000 to 14,000 barrels per hour. Another step consists of the use of two relief crews to load and unload a tanker.

The company is spending $415,000 to install additional steam boiler capacity and new lines and tanks at Richmond. Heavy oils are being heated to reduce their viscosity so that they may be pumped more rapidly into and out of tankers. The improvements being made at Richmond are expected to cut in half the time formerly required to load or unload the ships. Similar shore programs are being carried out at nine of the company's distributing points in Alaska and also at Marshfield and Willbridge in Oregon, as well as at Pt. Wells, Washington.

To Reverse Line

Grady Vaughn and associates have sold to Lion Oil Refining Company a pipe line from Magnolia, Arkansas, to the Atlanta field. It consists of 30,000 feet of six-inch and 11,000 feet of seven-inch line, having been laid soon after discovery of Atlanta for furnishing fuel to that field. Lion plans to reverse the line and move gas from Atlanta to Shell Oil Company's gasoline plant at Magnolia to be stripped and then through its own unit thence to its main line to move to El Dorado.

Contract Awarded For Concrete Barges

Award by the U. S. Maritime Commission of a $6,000,000 contract to the Port Newark Shipping Company for construction of five concrete oil barges was announced in Newark, New Jersey, November 11. The contract calls for the building of barges 350 feet long with 54-foot beams, the vessels to be provided with crews but not self-propelling. Other materials in addition to oil may be carried. Delivery of the barges is scheduled for 1942.

A spokesman of the Port Newark Shipping Company declared last week that the company plans immediately to begin construction of the ways for the vessels. The company was recently organized for the purpose of building concrete barges. President of the organization is Commander E. A. Hurst of New York City, formerly connected with the Emergency Fleet Corporation. It is understood that the barges will be more or less experimental and are intended to conserve steel for the use of tankers, cargo ships and naval vessels.

The commission awarded a $3,285,000 contract to San Jacinto Shipbuilders, Inc., for five barges which will be built at yards on the San Jacinto River near Highlands, Texas. Construction will begin at once with delivery of the first barge scheduled for early in April, 1942.

The company is owned by H. C. Cockburn, Houston oil man, and Harry K. Johnson of Highlands.

Stanolind Acquires Coronado Properties

Final papers were signed last week between officials of Coronado Corporation of Dallas and Stanolind Oil & Gas Company whereby the latter company took over the properties of the former. The trade is reported to have involved in excess of $5,000,000.

In the deal, Stanolind acquired all capital stock of Coronado, organized in 1930 by Dr. J. C. Karcher and associates. Coronado's properties included holdings in Texas, Louisiana and Alabama. Main properties are on the Texas Lower Gulf Coast where the company has 2000 barrels daily production in the LaRosa and Waelder fields. The company also has operated a 60,000,000-cubic foot cycling plant at LaRosa and had royalties in the Luby, Placedo and Chapman fields.

Announcement of the deal was made in a joint statement issued by Dr. Karcher, president of Coronado, and F. O. Prior of Tulsa, president of Stanolind. Coronado properties in Texas and Louisiana will be merged into Stanolind's holdings.

Stanolind is also negotiating for the purchase of half interest and operating control in the West Texas holdings of Landreth Production Corporation, involving 154 flowing and pumping wells, and a 6-well lease in the Aransas Pass area, South Texas. Bulk of the West Texas properties are in Ector and Pecos counties.

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Associations

Petroleum Electric Group Will Meet at Dallas

More than 200 sales engineers and executives from utility power companies over the nation are expected to attend the 13th annual conference of the Petroleum Electric Power Association when it meets December 4 and 5 at Dallas.

A highlight of the conference will be an address by Robert Haldane, Shell Oil Company, Houston, who will speak on "Changes in Refinery Electric and Steam Requirements Resulting from the Manufacture of Synthetic Rubber and Explosives."

In addition to Haldane's paper, talks during the first-day sessions will include those of Dave Levy and E. A. Koenig, Magnolia Pipe Line Company, Dallas; K. R. Albert, Louis Allis Company, Dallas; C. G. Unlaub, Electric Machinery Company, Dallas, all speaking on "Variable Speed Couplings and Variable Capacity Pumps." H. C. Gear, Lone Star Gas Company, Dallas, will bring a message from the Petroleum Industry Electric Association; and Don Knowlton, Phillips Petroleum Company, Bartlesville, Oklahoma, will speak on "The Future of Oil Production Viewed from the Standpoint of Present Day Production Methods."

Papers the second day will include those of B. J. Martin, publisher, Electrified Industry, Chicago, speaking on "New Uses of Electric Service"; G. R. Prout, manager, industrial control department, General Electric Company, Schenectady, New York, will speak on "Supplying Defense Needs"; and E. A. Armstrong, Public Service Company of Northern Illinois, Chicago, will tell "How Electric Utilities Have Met the Demand for Power."

Election of officers, directors and committeemen for 1942 will round out the last session. Present officers are: E. L. Robinson, Gulf States Utilities Company, president; H. E. Roberts, The Empire District Electric Company, vice president; and K. K. Kreamer, Houston Lighting & Power Company, secretary-treasurer.

Engineers to Meet at University of Oklahoma

Plans have been completed for the second petroleum engineers conference to be held at the University of Oklahoma, Norman, November 21-22.

Three guest lecturers will attend the conference. Kenneth B. Barnes, Gulf Oil Corporation, Tulsa, will address the meeting November 21 on "The Technique of Core Analysis Measurements." James A. Lewis of Core Laboratories, Inc., Dallas, will speak on "The Interpretation of Core Analysis Measurements."

The November 22 session will be featured by a lecture on "Electric Well Logging and Gun Perforating in Conjunction With Core Analysis," by Hubert E. Bale, consulting geologist of Oklahoma City.

Drilling Contractors Reminded They Face Big Job

A well attended first annual meeting of the American Association of Oilwell Drilling Contractors, held last week in Dallas, listened to plans for committee studies during the coming year on many problems concerning this branch of the industry. Included in these were those for improvement of safety conditions through cooperative effort and possible establishment of an accident prevention department; studies on priority requirements and procedures; wage and hour working regulations; taxes, with special emphasis on depletion rates; compensation insurance; transportation rates; drilling practices and equipment, and standardization of accounting methods. Committees have been appointed to work on all these problems, and initial steps in formulating definite plans for such studies were made during the convention.

From the speakers platform the contractors were told that they face a big job in being able to drill with reduced steel supplies, a sufficient number of wells to procure enough oil reserves to meet increasing consumption demands; that unless they cooperate in getting proper priority rates supply concerns soon will not be able to fill many orders; that the advice of the wage-hour regional divisions should be sought before establishing working conditions which might possibly be in violation of the labor act; heard a plea for standardization of account practices and contract forms, and were told of the advantages of cooperative association efforts, of compensation insurance, and of advancements in drilling practices and equipment.

Face Big Job

That the industry faces a big job and should realize how serious it is was the word brought by R. E. Allen, Director of Production for the Office of Petroleum Coordination, in a speech that was read by E. DeGolyer, Director of Conservation for the Office of Petroleum Coordination.

"Upon the industry rests a burden and responsibility which is going to become heavier and more important as the weeks and months roll by," Allen warned. "We must drill more wells, produce more oil, develop more proven reserves, obey sound conservation principles, do it all quickly and somehow do it with less material, particularly with less steel." Allen stated that the industry must learn to think in the following language: "Save a derrick here, give Uncle Sam a tank; save some casing there, give Uncle Sam some anti-tank guns; keep that rotary chain in good shape, repair it, nurse it along and give Uncle Sam 100 Garand rifles."

The OPC official then turned to the question of sufficient reserves, pointing out in this connection that while the industry had been through this condition before, but that this time it is more vital than ever, and that the handicaps are more severe because material shortages prevent expansion of drilling, greater quantities of oil are needed and many more of the country's ultimate number of reservoirs have been prospected.

"If you say reserves have increased in 40 years from 8 billion to 20 billion barrels that sounds impressive, but when you measure these reserves by current rate of production, the story looks different," stated Allen, and backed the statement up by showing that the 200,000 barrels produced daily in 1900 made reserves of that time equivalent to a 40-year supply, but that the 4 million barrels being produced each day today let the enlarged reserves represent only 14 years supply.

Find Reserves

There must be a lot of wildcatting to find new reserves, he continued, but at the same time warned that "we must drill those wildcats very carefully and be very economical with materials—in new fields and in future development in the partly developed fields, we must move toward wider well spacing patterns and sounder development and operating programs. This is essential from the standpoint of conservation and efficient operation, as well as to effect the minimum expenditure of scarce materials. With the shortage of materials that now exists and the probability that the future will be far worse, less material available forces wider spacing patterns." When the office of petroleum coordinator is convinced you need materials we are going to present your case to the proper governmental agencies and we are going to fight hard for you," but, Allen concluded, "on the other hand you must realize that our first duty is to national defense. That means we cannot help you to get materials for wasteful methods of operation, unnecessary duplication of facilities or for drilling unnecessary wells."

The warning that unless drilling contractors and producing companies commenced using available priority forms that supply houses soon would not be able to fill their needs came from W. L. Childs, Reed Roller Bit Company, who as an official of the Petroleum Equipment Suppliers Association, has been spending a lot of time working on priority ratings for the industry.

Childs told the contractors that they had been promised a priority order that would relieve all of the industry's supply troubles, but that as yet this order has not been issued. Whereas supply companies for 75 years have served the industry day and night seven days a week, this cannot be done much longer unless the industry gets a national defense priority rating, he warned. The reason much trouble has not been experienced in getting machinery to date has been because supply companies ordered raw materials well in advance, but they cannot do this unless their customers use either the PD-1 or P-22 priority orders, the two means currently available for procuring necessary materials, Childs explained. In this connection he urged the industry to make use of every means to obtain its fair share of the vital materials. Asserting that this called for the closest cooperation, Childs stated that the industry probably used 5,846,000 tons of ingot steel annually, divided as follows: Production-drilling, 3,175,000 tons; transportation, 1,843,000 tons; refining, 647,000 tons, and marketing, 181,000 tons. This is a sizeable quantity when it is considered that the nation's steel output in 1941 will be 86,000,000 tons, of which strictly military needs will use 35,000,000 tons.

Wisdom and necessity of cooperation between contractors were emphasized by J. E. Brantly, president of the American Association of Oilwell Drilling Contractors. The perfection of the oil industry today is attributable to the laudable, cooperative, and industrious ambitions of various groups within it, resulting in the availability of an essential commodity in innumerable forms throughout the remotest regions of the world, according to Brantly.

Need for an organization to exchange ideas and direct efforts of contractors was pointed out as a means to improve the service of the drilling contractor to the producer, and the obligation of the contractor to provide service was mentioned as the justification of the existence of contractors.

Brantly discussed the aims of the association, and how it proposes to correct faults and improve efficiency of the industry.

Purposes

A 12-point proposal was outlined as the purposes of the association:

1. To organize committee and group studies of the machinery and equipment.
2. To make comparative studies and to tabulate and record experiences in the use of drill pipe.
3. To make studies of drilling practices to inform members of those best suited for particular operations.
4. To improve status of personnel of the drilling industry.
5. To study national labor laws for benefit of members.
6. To promote safety.
7. To develop and make available standardized forms and systems of accounting.
8. To study transportation laws of the various states.
9. To promote better understanding between contractors and the operating oil companies.
10. To establish a basis for a clearer moral conception of duties of contractors to themselves, to the oil companies, and to the industry.
11. To establish local, regional, and national meetings.
12. To build firm foundation for drilling contractors to allow provision of more effective service by cooperative efforts.

Abstracts of papers delivered at the meeting follow:

The Contracting Industry

By Frank E. Stickle,
Mabee Oil & Gas Company

Drilling contractors annually complete about 75 percent of all wells drilled in the United States. When it is considered that from 25,000 to 31,000 wells are completed yearly, some idea of the magnitude of the drilling contractor's investment and requirements is gained. There are more than 2000 drilling contractors in the United States. They employ about 75,000 people, and actually support a much larger number.

About 4000 rotary-drilling rigs and 2800 cable-tool rigs are available for quick use in the United States, and of these drilling contractors probably own 75 percent. A rotary-drilling contractor with four active rigs will steadily employ about 65 people under average conditions.

The drilling contracting industry has been able to survive because it is as logical to drill oil and gas wells under contract as to build a house or a bridge under contract. In the past the drilling contractor has kept pace with the scientific developments connected with actual drilling operations. A certain amount of engineering, common-sense geology, and a generous portion of sound judgment must accompany every drilling project.

The drilling contractor of the future must keep pace with new developments, and he must be able to complete every phase of a drilling operation at least as well as the company for which he works. Crew loyalty, recognition of basic economic principles, use of suitable equipment, and close supervision of effort will help the drilling contractor hold whatever ground he has gained.

Contracting Personnel

By Harry L. Edwards,
Harry L. Edwards Drilling Company

To promote and insure success in any business, an efficient and smooth organization is essential. Only normal success may be expected of an organization comprised of individuals seeking personal gain. For outstanding success, members must have the welfare of the organization at heart.

A contractor's organization is no exception. Present-day specialization requires presence of men upon whom the contractor can rely to carry out orders or to direct procedure during his absence. Early contractors were self-sufficient, acting as contact man, office manager, and tool pusher combined; they had no time nor need for organization. Today, this type of individualist is in the minority. Contractors need help; from their organization, they must get the most from their materials and time, and must be able to meet the company engineers and superintendents on their own ground. This requires different personnel from those of a few years ago.

In the personnel, the contractor himself must be diplomatic, fair, a good trader, willing to take the bad with the good, adaptable to take orders contrary to his own ideas, and confident of his employes. Often a contact man is necessary for contractors who operate several rigs. This man must be respected by the producing companies and must have knowledge of hazards encountered in drilling wells. Tool pushers must be able to handle men, converse with company representatives, and carry out fishing jobs to completion. Drillers must have efficient organization of men working on rigs, and should train derrick men to act for him and to prevent unnecessary delays. Mud engineers are necessary to prevent losses attributable to faulty drilling muds, and he may also be used to check reports, tally pipe, casing, and keep correct measurements.

Successful organizations are those with carefully chosen personnel trained to fulfill work requirements in the most efficient and economical manner.

Cooperation Within the Industry

By Joseph Zeppa,
Delta Drilling Company

The time has come when every branch of the oil industry must learn to cooperate within and without, not only for its own salvation but to produce the best and most efficient results for the country as a whole. This can be done without surrender of independence.

The first step toward cooperation is the building up of a strong association representative of the entire drilling business. This has occurred in the formation of the Association of Oilwell Drilling Contractors, which with persistent effort will soon embrace in its membership all the active operators in the business.

I would suggest to the association that it immediately devote its attention and efforts to the following problems which appear to be of vital importance to the improvement of conditions in the drilling business:

1. The adoption of a standard system of accounting with particular reference to drilling costs;
2. Adoption of standard forms of drilling contracts;
3. Investigation of the wages, hours, and working conditions prevailing in various areas;
4. Investigation of transportation costs;
5. Accumulation and distribution of general information affecting the drilling business.

Wages and Hours

By Gus C. Street, Jr.,
Regional Director, Wage-Hour Division, U. S. Department of Labor

Industry is invited and urged to seek the advice and guidance of regional directors of the wage-hour division on labor-act questions in advance of establishing any changes or regarding any questions. It is preferred that violations be prevented rather than creating conditions that call for prosecution for enforcement.

The wage-hour act permits freedom of contract to exist between employer and employe, except as to minimum wage and hours. Consequently, there is no objection under the law to an employer reclassifying or recontracting with employes now on a wage or salary basis so as to put them on an hourly basis, and no objection to hiring new employes on an hourly basis—so long as the hourly rates are not fixed below the minimum provided in the act, and new rates are established in good faith and strictly adhered to and the employes are paid time and one half for all hours worked each week in excess of 40. However, be sure that a contract is drawn up whenever changes in rates are made.

However, it is a violation of the act for an employer to adopt the so-called "6-2" plan or any other similar plan, whereunder the regular workday of 8 hours is divided into a certain number of straight-time hours and a certain number of over-time hours.

Where men, cutomarily on a tour basis, report for duty on the rig or scene of operations, and after commencing work, are prevented from completing their full tour, they may be considered as having worked the full tour, and may be so reported and compensated. In the case of watchmen who live on the premises and water pumpers who devote only a portion of their time to such employment, even though they may remain at or near the rig or scene of operations, agreements may be made as to the normal number of hours per week required for performance of the actual labor required for such employment, and compensation fixed at a regular rate above the minimum required by law for the first 40 hours of such normal hours of service, with time and one half per hour for the remaining hours of such normal hours of service.

Travel time on water is considered as hours worked in all situations in which the employer requires his employes to use the water conveyance of the employer, or where the circumstances are such that the use of such conveyance is the only feasible means of transportation to the location.

Tool pushers who are general supervisors over drilling operations and engaged in essentially non-manual work and are compensated at least $200 per month are exempt as administrative employes. Drillers in charge who are in sole charge of the drilling of a well are also exempt as executive employes, if they are paid $30 or more in any work week in which they do any work.

Drilling Practices

By C. W. DeLancey,
Humble Oil & Refining Company

The contractor is a specialist in drilling wells. He performs a real service to the industry and the security of his position is limited largely by his ability to meet the requirements of the operators. To improve drilling methods, it is necessary to accumulate and study much data. Many groups are participating in this endeavor. As contractors will drill approximately 75 percent of the 30,000 wells next year in the United States, their obligation to the industry is apparent.

What are the requirements of the operators? Foremost, but seldom mentioned, is the contractor's reputation for honest and fair dealings. It is important that each party has confidence in the other which will enable him to make adjustments to their mutual satisfaction. The contractor's use of adequate equipment is taken for granted. Employment of competent, skilled workmen who will use methods that will result in a safe, economical, and rapid completion is also a concern to the operator. It is with such practices and methods that we are now interested.

Perhaps the fear of a blowout is the greatest mutual concern. Preventer equipment available is adequate if properly maintained, but frequent examinations should be made to determine its condition.

Although bits remain fairly well to gauge and better mud is used, drill pipe occasionally sticks, usually at the drill collars. If this occurs while pipe is being raised or lowered, driller should try to free it in direction opposite to travel at the time of sticking. Circulation should be attempted to furnish clue to cause of sticking and best method of freeing the pipe. Safety joints should be run one joint above the drill collars to give flexibility between it and the collar as-

sembly, and at the same time retaining the minimum amount of assembly to recover by wash-over or other means.

Bridges are removed by washing in preference to reaming, if possible, to prevent sidetracking. If this is not successful, it is reasonably safe to rotate provided the rate of penetration is maintained well above that possible when drilling in new hole. If balling of the bit makes this impossible, a further attempt to drill through the bridge should be made with a small bit without drill collars.

The advent of higher slush pump pressures requires tool joints which will withstand greater pressure differentials without leaking. Neither manufacturer nor the user will be completely satisfied until a joint is designed which will more nearly approach the expected service of the pipe to which it is attached, and which may be more economically repaired. Small leaks, if undetected, cause fishing jobs, and are often discovered by counting pump strokes.

Trends in Rotary Drilling Machinery and Equipment

By John M. Shimer,
Equipment Engineers, Inc.

A study of drilling equipment of 15 or 20 years ago is beneficial in emphasizing the mistakes made in the past and increasing appreciation of the improved conditions of today, as well as furnishing enlightment concerning even greater efficiency and productiveness in the future. By going back to examine equipment used 20 years ago, we find most of it wholly inadequate for drilling the deep wells of today, in design, construction, and material, as well as unsatisfactory performance caused at least partly by ignorance of proper care of equipment.

Rotary drilling has come far in the last 15 or 20 years. Equipment of all types has been improved to withstand the severity of modern drilling, with adaptations for higher rotary speeds, increased weight on bit, and provisions for absorbing shock loads and operating strain on machinery.

The modern rig in the hands of an experienced crew makes the drilling of holes 10,000 feet deep as easy and as rapid as was formerly the case with 5000-foot holes. The cost per foot for maintenance and depreciation are much less, while the initial cost of equipment is not proportionately higher, although there is a persistent rumor that contractors cannot make a profit today. This economic problem may be solved in part by each contractor answering the following questions according to his particular situation:

1. Is your drilling machinery and equipment receiving proper care and mechanical attention?
2. Are your rigs depreciating too rapidly because of working beyond their capacity?
3. Do you know exactly what your maintenance and depreciation costs are?
4. Are you consistently on the alert to improve the operating efficiency of crews and their handling of equipment?
5. Do you have technically trained personnel qualified to detect the mechanical superiority of one piece of equipment over another and to offer constructive suggestions to equipment manufacturers concerning needed improvements? You are competing with company tools which are backed by such facilities.
6. Are your rigs well balanced to eliminate bottle-necks or weak links which, if removed, would permit more efficient rig operation? Modern drilling, as all other businesses, requires mental effort and scientific management for survival against competition. Can you afford to overlook numerous small leaks where profits dribble away to losses if they are not plugged?

Accounting Practices

By H. A. Pickens, C.P.A.,
McCammon, Morris & Pickens

Accounting records of drilling contractors must be designed and maintained which will make easily available all the information required by management. In addition to data required almost daily, such as cash balances, current maturities of liabilities for the payment of which financial arrangements must be made, drilling reports on contracts in progress, etc., there must be periodical—preferably monthly—statements of operations and financial condition. These statements should be the basic means of analysis by the management of every angle of business, not only from the standpoint of current operations and financial position, but for the purpose of planning for future.

In general, the two fundamental methods of accounting are the "cash" and the "accrual" basis.

The cash system disregards many balance sheet accounts, and thus fails to provide the information necessary for the preparation of a statement of financial condition. It has several other important weaknesses.

The "accrual" basis consists of all the revenue earned in a given period and the charge thereto of all the costs and expenses applicable to such revenue. It provides all the necessary records needed by management. There are two variations of the accrual method of accounting, namely (1) the percentage of completion method, and (2) the completed contract basis. The completed contract basis is probably used by the majority of contractors, and in the author's opinion is the superior one. It provides for the accumulation of all costs on each job in a work-in-progress account and, if the job is not completed within the year in which it was commenced, the carrying forward of such costs into the succeeding period. No entry is made of revenue until it is earned by completion of the contract. In this manner the contractor records no profit on a job until it is completed, eliminating the possibility which exists under the percentage of completion method of having a book profit of one year wiped out by the cost of a fishing job, etc., in the next. Another advantage is that the records of each year reflects the profit or loss on each drilling contract completed in that year.

Largely due to the necessarily heavy investment of the drilling contractor in equipment, depreciation is a major item and frequently the subject of controversy with the Bureau of Internal Revenue and with the Departments of Revenue of the various states having income-tax laws. Several basic methods, as well as variations thereof, are acceptable for the calculation of depreciation on drilling equipment. The composite method, which is probably in most general use, consists of the application to all the drilling equipment of a depreciation rate arrived at by estimating the average useful life of the machinery as a whole.

Compensation Insurance

By B. F. King,
Pacific Employers' Insurance Company

The present-day system of workmen's compensation is based upon the broad theory that industry should provide a sure and definite system for taking care of the injuries which may result to workmen in the same manner as does industry provide for the repair and replacement of its tools and machinery.

The insurance contract, by stipulating a fixed and maximum premium cost to the employer, enables the employer to anticipate in advance the added cost of liability in the operation of his business. Where his insurance provides a stipulated maximum premium he may do so with certainty, and thus include the cost in the price of his products or services.

In the beginning there was insufficient statistical data for the computation of rates with the result that a number of insurance companies, under pressure of competition, charged inadequate rates and failed, leaving the intended beneficiaries without their compensation. This led to the fixing of rates by the cooperation of insurance companies in collecting and massing their statistical data under the supervision of a central bureau, usually under state supervision.

The Texas law provides that the Board of Insurance Commissioners shall establish classifications and promulgate rates for each classification. These rates are made on the basis of loss cost per hundred dollars of payroll over a three-year period, as compiled by reports filed annually by each compensation insurance carrier. Since the rate is based on the aggregate experience of all risks, it obviously represents the average loss costs and loading expense.

It is not always true that the claims experience of an employer in the past will be indicative of his claims experience in the future. In recognition of these possible inequities, some insurance carriers provide in their policy contracts for an adjustment of the premium, not upward, because the stipulated maximum premium is that stated in the policy, but downward if the individual loss experienced of the assured under each successive expiring policy shows that the stipulated premium collected actually was excessive with respect to that individual employer. This participating plan permits adjustment of inequities of overpayment which might have been imposed upon an individual employer by the application of the statutory rate and of the experience rating plan.

Insurance contracts contain as a very important element the furnishing of safety engineering services by the insurance company. This service is provided with the objective of reducing the frequency and also the severity of injuries to employes.

Give your compensation insurance buying serious consideration. Have your insurance agent analyze your risk; place your insurance in responsible companies who will render efficient claims and effective engineering service; require a monthly statement from your insurance carrier showing the name and date of each injured employe and nature of the accident, with the estimated cost of each individual claim, also the final cost on each claim segregated as to medical and compensation paid.

ALL WRAPPED UP TO TAKE A BEATING!

Convolute tube construction provides most rigid cartridge yet developed for seismograph gelatin.

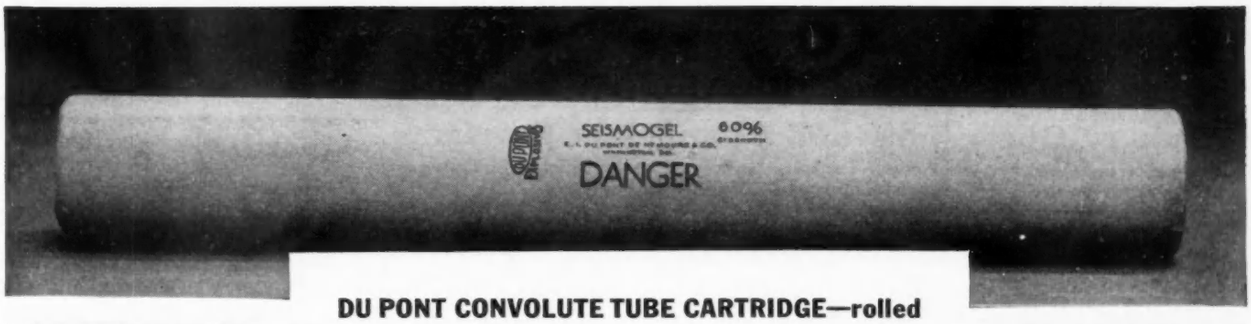
SALES RECORDS prove that more and more seismograph crews shooting gelatins insist on convolute tube cartridges. The reasons are not hard to find.

Du Pont convolute tube cartridges give a rigidity surpassing anything possible with earlier types of wraps. Every inch of the shell has the *same* number of layers of finest quality shell paper—and every layer is glued from end to end with an adhesive especially selected for the job. That explains why, even in difficult holes, Du Pont convolute tubes practically never pull loose, or tear—why they don't buckle or split even under seemingly excessive loading pole pressures.

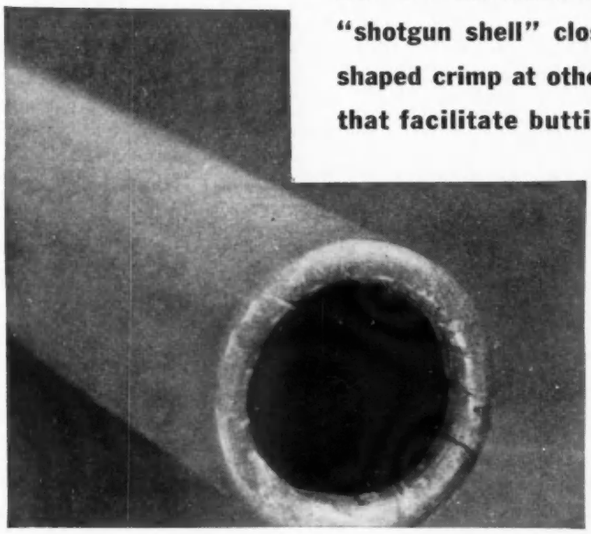
Because convolute shells are more rigid, the gelatin can be made softer and more cohesive. Thus, it's easier to insert caps in primer cartridges, and the gelatin doesn't fall out when cartridges are cut into segments. Furthermore, segments are held intact by the fully glued tube.

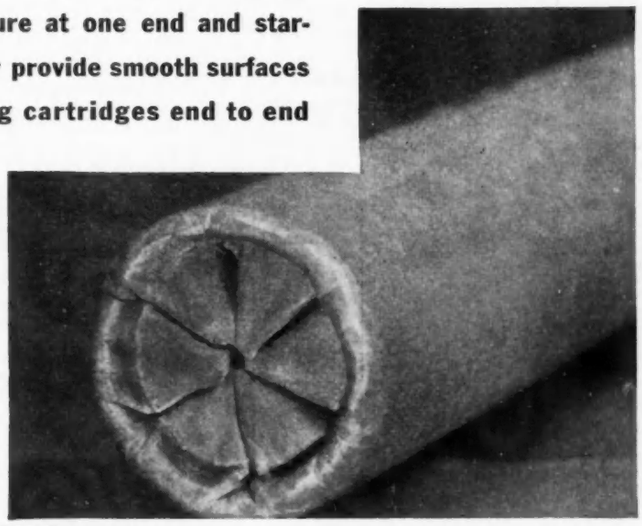
Du Pont convolute tube cartridges are available loaded with either Du Pont Seismogel or Du Pont Seismograph 60% Hi-Velocity Gelatin. Sizes are 2" x 2-½ lb. and 2-¼" x 5 lb. With either size, and either explosive, you get a modern gelatin, packed in a cartridge that's built to take the beating it will get on the job.

E. I. du Pont de Nemours & Co. (Inc.)
Explosives Dept., Wilmington, Delaware



DU PONT CONVOLUTE TUBE CARTRIDGE—rolled "shotgun shell" closure at one end and star-shaped crimp at other provide smooth surfaces that facilitate butting cartridges end to end





DU PONT

SEISMOGRAPH EXPLOSIVES AND BLASTING ACCESSORIES

Markets Strong but Prices Pegged by Government

Prices throughout the industry late last week were unchanged from the levels that had prevailed in the several preceding weeks, with even North and West Central Texas crude postings restored as before their recent 7-cent advance, in compliance with the wishes of the Office of Price Administration.

(The North Texas "adjustment" to the Oklahoma-Kansas schedule was initiated November 6 by Sinclair Prairie Oil Marketing Company and was followed by several other purchasers, including The Texas Company, Stanolind Oil Purchasing Company, and Magnolia Petroleum Company. But the OPA immediately summoned representatives of the purchasers to Washington, and at a conference November 10, the Sinclair and Texas companies agreed to withdraw the 7-cent advance. The old schedules were generally restored by November 173.)

The OPA's victory in preventing the North Texas advance served further notice that the government proposes to require its approval henceforth of any increases in prices of either crude or refined oils.

"Prices cannot be advanced first and discussed afterward," declared Price Administrator Henderson. "We are studying the whole crude price situation in the Mid-Continent area," he said, "and this study will be pressed forward rapidly. It will include specific consideration of whether the customary price differential on North and North Central Texas crudes, which is of nine years' standing, is still justified. This applies to differentials in other areas as well. In the meantime, prices, which are generous compared with those obtaining until recently, should remain stable."

The price administrator answered the contention that the revision was an "adjustment" rather than an increase by saying that the prices nevertheless were 7 cents a barrel higher after the change than before, and that the nomenclature used was irrelevant. He added that, moreover, the advance, if permitted, might be interpreted elsewhere as application of the principle of "squatter sovereignty" to dealings with the CPA.

The abortive revision of North Texas postings also has had its repercussions in the markets for refined products, from refinery dock to retail outlet, as the price administrator on the next day, November 7, sent letters and telegrams to producers, refiners, and marketers of crude oil and its products, asking that all further price advances first have approval of his office.

In the communication to refiners and marketers, the administrator asked that justification be shown for any increase in prices; and in that to producers and crude purchasers, he pointed out that the OPA and the Office of Petroleum Coordinator were conducting a comprehensive investigation of the Mid-Continent crude price situation, and requested that no crude price increases be made pending completion of the survey.

Meanwhile, the markets for crude in the Mid-Continent continue exceptionally strong, with premiums reported as being paid. Unconfirmed reports indicate that some independent crude buyers in the East Texas field are offering producers premiums up to 10 cents a barrel above posted prices, agreeing in some instances to pay the bonus cash in advance for 6 months.

Chapel Hill Gas System, sole purchaser of crude and distillate in Chapel Hill field, Smith County, eastern Texas, increased its price at the well for distillate (averaging 63 gravity) from $1.25 to $1.30 a barrel effective November 7, although the price of Chapel Hill 43 gravity crude was left unchanged at $1.18 a barrel. The purchaser delivers about 1200 barrels distillate and crude mixture averaging 57 gravity to Gladewater Refining Company; also sells spot quantities in tank cars from Overton, Texas, rack, and late in October contracted to sell 25 cars of the mixture to the Winnepeg, Canada, plant of Radio Oil Company.

Trends of Operations and Changes in Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

WEEK ENDED	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	FUEL OIL STOCKS	
					Gas Oil & Dist. Fuels	Residual Fuel Oil
1939:						
April 22	3,526,700	3,280,000	277,156,000	[2]87,769,000	21,085,000	105,035,000
April 29	3,568,200	3,405,000	278,440,000	86,794,000	[7]25,844,000	[7]108,409,000
May 6	3,580,900	3,275,000	[2]278,607,000	86,216,000	26,167,000	108,597,000
August 5	[2]3,909,400	3,445,000	268,982,000	76,431,000	35,601,000	114,512,000
August 26	[5]1,690,800	3,475,000	246,982,000	73,475,000	37,722,000	116,237,000
October 7	3,435,850	3,505,000	231,564,000	[6]71,152,000	38,549,000	114,397,000
October 21	3,771,550	[3]3,650,000	[3]229,127,000	72,122,000	39,358,000	115,060,000
1940:						
January 27	3,611,600	3,470,000	237,339,000	87,914,000	27,407,000	103,015,000
February 24	3,732,100	3,490,000	240,836,000	96,719,000	25,390,000	103,419,000
March 30	3,841,250	3,585,000	250,561,000	101,370,000	23,778,000	105,081,000
April 20	3,858,550	3,535,000	254,881,000	[1]102,817,000	24,779,000	103,323,000
April 27	3,845,250	3,555,000	256,670,000	102,452,000	24,997,000	102,552,000
May 25	3,835,650	3,580,000	259,330,000	100,297,000	28,356,000	104,015,000
June 22	3,846,450	[2]3,690,000	260,891,000	97,276,000	32,751,000	104,683,000
June 29	3,639,550	3,625,000	262,059,000	95,142,000	33,590,000	104,486,000
July 27	3,690,400	3,555,000	262,579,000	90,173,000	38,981,000	105,924,000
August 31	3,501,350	3,575,000	265,865,000	85,393,000	44,766,000	108,774,000
September 28	3,799,950	3,600,000	263,609,000	82,273,000	47,986,000	108,450,000
October 26	3,640,300	3,565,000	262,746,000	80,891,000	48,893,000	108,475,000
November 9	3,584,200	3,510,000	261,631,000	[6]79,847,000	48,408,000	107,687,000
November 30	3,335,050	3,510,000	262,679,000	80,284,000	46,212,000	106,618,000
December 28	3,385,500	3,585,000	261,552,000	83,274,000	42,266,000	102,620,000
1941:						
January 25	3,599,100	3,625,000	260,093,000	88,762,000	39,039,000	100,297,000
February 22	3,629,650	3,590,000	261,783,000	95,812,000	34,381,000	98,631,000
March 29	3,746,550	3,625,000	266,187,000	[2]99,727,000	29,949,000	96,152,000
April 26	3,726,850	3,675,000	266,149,000	96,647,000	29,543,000	94,732,000
May 31	3,786,100	3,699,000	262,356,000	93,845,000	33,524,000	92,757,000
June 28	3,847,250	3,930,000	259,399,000	91,461,000	35,732,000	92,896,000
July 12	3,870,750	4,090,000	255,567,000	89,561,000	37,812,000	92,699,000
August 2	3,695,250	3,845,000	252,535,000	86,779,000	41,433,000	94,800,000
August 30	4,004,700	4,070,000	249,413,000	81,672,000	45,351,000	95,052,000
September 27	4,060,000	3,980,000	246,649,000	81,003,000	49,950,000	95,251,000
October 4	3,860,750	4,015,000	246,144,000	[6]80,870,000	49,553,000	96,016,000
October 11	4,070,950	4,075,000	243,571,000	81,381,000	51,289,000	95,527,000
October 18	[4]4,110,550	[4]4,120,000	243,605,000	82,584,000	52,403,000	95,800,000
October 25	4,098,800	4,060,000	242,261,000	83,343,000	53,183,000	95,295,000
November 1	4,071,200	4,080,000	243,340,000	83,223,000	53,766,000	96,527,000
November 8, 1941	4,096,100	3,945,000	.....	82,777,000	54,643,000	95,815,000
November 8, 1940	3,584,200	[8]3,512,000	[4]263,820,000	79,262,000	48,474,000	106,460,000
Change in past year.	+14.3%	+12.3%	—7.8%	+4.4%	+12.7%	—10.0%

[1] All time peak. [2] Peak for year. [3] Lowest since April, 1922. [4] Stocks, Nov. 2, 1940.
[5] Lowest since October, 1922, due to shut down of six Mid-Continent states. [6] Lowest for year.
[7] Prior to April 29, 1939, data did not include stocks at terminals, in transit, etc., except in California.
[8] November, 1940, daily average.

Production and Runs High; Eastern Stocks Increased

Crude-oil production in the United States increased a little in the week ended November 8 and was only slightly under the all-time peak of three weeks before, as well as in line with current unprecedented demand for petroleum. Refinery runs dropped materially but also were fairly well in line with prevailing high consumption.

Stocks of the major products reflected the decrease in crude runs to stills, as there was a substantial draft on stocks of gasoline, although further additions were made to inventories of both light and heavy fuel oils. United States crude production in averaging 4,096,100 barrels daily in the week of November 8 was about 25,000 barrels a day greater than in the previous week and 14.3 percent larger than in the corresponding week last year, when output averaged 3,584,200 barrels daily.

Crude runs to stills dropped from 4,080,000 to 3,945,000 barrels daily, a decrease of 135,000 barrels, but were 12.3 percent above the daily average runs of 3,512,000 barrels for November of last year.

Gasoline stocks were lowered from 83,223,000 to 82,777,000 barrels, a reduction of 446,000 barrels for the week or 64,000 barrels daily, but the new total was 3,500,000 barrels (4.4 percent) above that reported a year previously.

Stocks of gas oil and distillate fuel were further increased nearly a million barrels, from 53,766,000 to 54,643,000 barrels, and the latter quantity was over 6,000,000 bar-

rels (12.7 percent) in excess of the stocks held November 8 last year.

Residual fuel oil stocks were increased about 300,000 barrels during the week to 95,815,000 barrels. The latter amount was 10,645,000 barrels (10 percent) less than that on hand a year before; but east of California, an increase of one half million barrels since a year ago is indicated, as the present stocks in California are 11,186,000 barrels smaller than at this time last year.

The reduction in refinery runs represented a slowing down of operations to 91.2 percent of rated capacity from 94.6 percent the previous week, with plants less active in all districts except the East Coast, where runs rose to 667,000 barrels daily (99.1 percent of capacity) from 655,000 barrels a day (97.3 percent) the week before.

In reflection of the higher runs to stills on the East Coast, stocks of heating oil in that district were increased 523,000 barrels, and gasoline was added to storage in the amount of 114,000 barrels, although there was a withdrawal of 471,000 barrels of residual fuel oil from storage. The heating oil inventory situation on the East Coast is good, as the November 8 total of 22,042,000 barrels was nearly 5,000,000 barrels above that of 17,255,000 barrels on hand a year previously. Gasoline stocks at 19,334,000 barrels November 8 were 600,000 barrels above the 18,719,000 barrels held on the corresponding date last year. Eastern residual fuel oil stocks at 11,243,000 barrels were 1,200,000 barrels smaller than on November 8 last year.

In practically all districts, gasoline stocks are somewhat larger than a year

Wholesale Prices of Refined Products in Principal Markets

REFINED GASOLINE	Range Last Week (Cents a Gal.)		Changes from Week Before	
Oklahoma Refineries:				
60 Octane and Under	5¼	5⅝	...	...
63-66 Octane	5⅝	6	...	...
72-74 Octane	6	6⅜	...	...
80-82 Octane, Ethyl	6¾	7¼	...	...
Mid-Western Tank Car:				
60 Octane and Under	5¼	5⅝	...	...
63-66 Octane	5⅝	6	...	...
72-74 Octane	6	6⅜	...	...
80-82 Octane, Ethyl	7⅜	7⅝	...	...
New York Harbor:				
68-70 Octane	8	8	...	...
72-74 Octane	8	8⅛	...	...
Min. 80 Octane, '39 Research	8½	9	...	...
Gulf Coast:				
60 Octane unleaded	5½	5¾	...	...
65 Octane unleaded	5¾	6	...	...
68 Octane unleaded	6¼	6½	...	...
70 Octane unleaded	6¼	6⅝	...	...
72-74 Octane leaded	6¼	6⅜	...	...
Min. 80 Octane, '39 Research	6¾	6¾	...	...
NATURAL GASOLINE				
Grade 26-70:				
F.O.B. Group 3	5⅛	5⅛	...	...
F.O.B. Br'kenr'ge, Tex.	4¾	4¾	...	...
KEROSENE				
Oklahoma Refineries:				
41-43 water white	4⅜	4¾	...	...
42-44 water white	4⅛	4⅞	...	...
Mid-Western Tank Car:				
41-43 water white	4⅜	4¾	...	...
42-44 water white	4⅛	4⅞	...	...
New York Harbor	5⅜	5½	...	—¼
RANGE OIL				
At Oklahoma Refineries	4	4⅜	...	...
In Mid-Western Market Group 3, basis	4	4¼	...	...
LIGHT FUEL OILS				
Oklahoma Refineries:				
No. 1 straw	3½	4¼	...	...
No. 3	3½	3⅝	...	...
Mid-Western Tank Car:				
No. 1 white	3⅞	4⅛	...	...
No. 3	3½	3⅝	...	...
New York Harbor:				
No. 1	5⅜	5½	...	—¼
No. 3	5¼	5¼	...	...

HEAVY FUELS	Range Last Week (Per Bbl.)		Changes from Week Before	
Oklahoma Refineries:				
No. 6	$0.90	$0.90	+.10	...
Mid-Western Tank Car:				
No. 5	.85	.85	...	...
No. 6	.85	.87½	...	...
New York Harbor:				
No. 5	1.65	1.75	...	...
No. 6	1.35	1.50	...	...
BUNKER C FUEL OIL (Per barrel, ships' bunkers)				
Gulf Coast	$0.85	$0.95	...	...
New York Harbor	1.35	1.50	...	...
DIESEL OIL (Per barrel, ships' bunkers)				
Gulf Coast	$1.65	$1.80	...	...
New York Harbor	2.15	2.15	...	...
LUBRICATING OIL (Cents a gal.)				
Oklahoma Refineries:				
Bright Stock, 150-160 viscosity at 210°, 10-25 pour test	22½	23	...	...
Neutral oil pale No. 3 Color, 150 viscosity at 100°, 0-10 pour test	14½	14½	...	...
Western Pennsylvania:				
Bright Stock, 145-155 viscosity at 210°, 25 pour test	25	26	...	...
Neutral Oil No. 8 Color, 150 viscosity at 70°, 25 pour test	31	31	...	...

United States Crude Oil Production Up Slightly

Estimates Compiled by The OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (Nov.)	State Allowable (Barrels Daily in Nov.)	BARRELS DAILY FOR WEEK ENDED Nov. 8	Nov. 15
TEXAS:				
Texas Panhandle	.....	.....	80,200	79,500
North Texas	.....	.....	106,100	104,800
West Central Texas	.....	.....	31,500	31,500
West Texas	.....	.....	287,400	287,100
East Central Texas	.....	.....	87,500	82,700
East Texas Field	.....	.....	369,800	370,200
South Texas	.....	.....	221,200	217,200
Texas Gulf Coast	.....	.....	292,300	290,300
Total Texas	1,454,700	1,479,618§	1,476,000	1,463,300
CALIFORNIA:				
Long Beach	.....	.....	38,700	38,500
Midway-Sunset	.....	.....	57,500	53,300
Kettleman Hills	.....	.....	37,600	37,800
Wilmington	.....	.....	89,700	89,500
Others	.....	.....	434,800	447,600
Total California	626,700	613,200*	658,300	666,700
OKLAHOMA:				
Oklahoma City	.....	.....	82,900	80,500
Seminole Area	.....	.....	112,900	110,200
Others	.....	.....	225,950	226,200
Total Oklahoma	469,400	428,000	421,750	416,900
ILLINOIS:				
Salem	.....	.....	77,150	77,000
Louden	.....	.....	60,700	60,700
Centralia	.....	.....	9,100	9,000
Other New Pools	.....	.....	257,250	257,000
Old Pools	.....	.....	12,200	12,100
Total Illinois	408,100	.....	416,400	415,800

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (Nov.)	State Allowable (Barrels Daily in Nov.)	BARRELS DAILY FOR WEEK ENDED Nov. 8	Nov. 15
LOUISIANA:				
North Louisiana	.....	.....	80,800	82,050
South Louisiana	.....	.....	265,500	270,200
Total Louisiana	333,200	347,058	346,300	352,250
KANSAS	253,500	257,000	238,950	256,950
NEW MEXICO	115,200	116,500	116,500	116,400
EASTERN STATES:				
Pennsylvania Grade	71,000	.....	77,950	73,450
Others, Eastern	23,300	.....	18,500	18,500
Total Eastern States	94,300	.....	96,450	91,950
MOUNTAIN STATES:				
Wyoming	83,400	.....	81,200	81,350
Montana	20,600	.....	20,050	21,200
Colorado	5,200	.....	4,950	5,150
Total Mountain States	109,200	.....	106,200	107,700
MICHIGAN	47,400	57,550†	57,800	60,950
INDIANA	20,500	.....	18,950	18,800
ARKANSAS	76,500	73,653	72,400	72,350
MISSISSIPPI	55,100	.....	64,050	64,300
NEBRASKA	6,200	.....	6,800	6,100
‡Total 8 Prorated States	3,376,000	3,372,579	3,388,000	3,405,800
Total United States	4,070,000	.....	4,096,850	4,110,450

* Recommendation of Conservation Committee of California Oil Producers.

† No definite state allowable fixed under prescribed regulations; figure shown here represents actual production in 4 weeks ended October 25.

‡ Texas, California, Oklahoma, Louisiana, Kansas, New Mexico, Arkansas, Michigan.

§ Calculated daily average of actual production at beginning of month, allowing for usual under production of 3½ percent below net allowable, which was figured at 1,533,283 barrels daily as of November 1. However, allowable normally increases as new wells are completed, and consequently, actual daily average production for month may be expected to be slightly greated than average as calculated for November 1. Under November order, most Texas fields were ordered shut down November 2, 8, 9, 11, 16, 23, 27 and 30.

ago, and in the Indiana-Illinois-Kentucky area they are nearly 2,000,000 barrels larger at 15,360,000 barrels. The only district with less gasoline than a year ago is the Texas Gulf Coast, where the 10,500,000-barrel inventory is 2,000,000 barrels less than the storage of a year ago.

Stocks of light fuel oils likewise are up from a year ago or about unchanged in most districts, with California showing a gain of over 2,000,000 barrels and the East Coast the previously mentioned increase of 5,000,000 barrels; and as in the case of gasoline, the Texas Gulf Coast is an exception, having 2,000,000 barrels less than at this time last year, with 6,660,000 barrels on hand.

While all stocks of residual fuel oil east of California are only a little larger than a year ago, the Indiana-Illinois-Kentucky area accounts for a million barrel increase and the Louisiana Gulf Coast for one half million barrels, those substantial gains being largely offset by the 1,200,000-barrel reduction in East Coast stocks and small decreases in all other districts.

Texas Commission Explains Close-Spacing Formula

Field rules issued by the Texas Railroad Commission last week explained for the first time the method used by the commission in reducing allowables for wells spaced too close together. In many fields the commission has required that where wells were too close, the allowable would be reduced so far as the acreage credit is concerned "in the proportion of the square of the mean distance."

In its order on the Scotland, Antelope, and New York City fields, the commission defined the meaning of the quoted phrase as follows:

"By 'mean distance' is meant the average distance to other wells on the same lease completed in the same horizon. This shall be the average of the distances to the three closest wells in the case of wells drilled further than 1320 feet from the nearest boundary; the average distance to the two closest wells in the case of a well drilled nearer than 1320 feet to the lease boundary. It is provided that the distance to other wells on the lease will be limited to 1320 feet for the purpose of calculating the mean distance. It is further provided that in the event the number of wells is not sufficient to determine the mean average as outlined above, a distance of 1320 feet shall be used in lieu of distance to wells for this purpose."

Arkansas Gas Plant

McKamie Gas Cleaning Company is preparing to file charter of incorporation with the Arkansas secretary of state with announced plans to construct a $500,000 sour gas desulphurization plant near Stamps to treat gas from the McKamie field, LaFayette County.

Three directors of The Carter Oil Company and The Atlantic Refining Company will be incorporators. Both these companies have large gas reserves in southwest Arkansas.

Kansas Hearing

December demand and allocation hearing for Kansas has been set for November 21 at Wichita. Allowable for the current month is 257,000 barrels daily.

World-Wide Developments

Blue Goose Sells Peruvian Crude Oil to Brazil

A market for 60,000 barrels per month of high-gravity Peruvian crude in Brazil has been arranged by Blue Goose Petroleum Company through a contract with a Brazilian concern, Sociedad Nacional de Comercio y Transportes, according to a report from Lima. The crude will probably be carried from the 90,000-acre Agua Caliente concession of Blue Goose by pipe line to Pucallpa on the Ucayali River, where it will be transferred to barges for shipment down the river to the Amazon and into Brazil. Part of the crude is to be refined at the Ipiranga refinery at Rio Grande, Brazil, and the remainder will be refined at a plant to be built at Manaos.

Blue Goose Petroleum Company opened the Agua Caliente field in February, 1939, and recently had 5 productive wells. Production has been curtailed heretofore because of lack of an outlet. The field, the first productive region east of the Andes in Peru, is a structure roughly 16 miles long by 7 miles wide lying about 20 miles above the juncture of the Pachitea and Ucayali rivers. The company has planned several additional wells. A topping refinery with a daily capacity of 1000 barrels of crude is reported under construction at the field to provide products for the neighboring region.

The Peruvian government is opening the jungle territory around the Agua Caliente field by building a highway from Lima to Pucallpa on the Ucayali River. Completion of the highway is expected some time in 1942. Development of the field has led the Brazilian government to conduct explorations in the Amazon Basin bordering on Peru. It is believed the structure at Agua Caliente extends northeast into Brazil.

Venezuelan Well Finally Completed

After several months of extensive testing, The Texas Company of Venezuela has completed Rincon Largo 1, south of the Santa Ana field in Anzoategui State, Venezuela. Considerable delay was encountered by fishing jobs, but the test was drilled to 9631 feet. Although little information on the well has been released, last April during a test it flowed at the rate of 385 barrels daily of 35.6-gravity oil on 3/16-inch choke through perforations at the 8775-8790-foot level.

Exploratory Drilling In China Favorable

Recent exploratory drilling by the National Resources Commission of the Chinese National government in the western provinces of Shensi, Kansu and Szechwan is reported to have given very promising results, according to Bureau of Mines information. Production in small but commercial quantities of crude is occurring in Kansu. Oil is also believed present in the provinces of Sikang and Sinkiang.

Crude production in China remains low, being estimated at only 440,000 gallons (U. S.) last year. Difficulty in obtaining drilling and production equipment is one of the chief obstacles to be overcome. The National Geological Survey of China reports it carried out during 1938-1940 extensive surveys in collaboration with the Ministry of Economic Affairs in 11 provinces. Several corporations assisted by the government have been created to develop the nation's petroleum and other natural resources.

Colombia Appoints New Petroleum Minister

A new minister of petroleum, Dr. Nestor Pineda, has been appointed in Colombia. The former incumbent, Dr. J. P. Manotas, who introduced in the Colombian congress the pending bill to improve the national petroleum law, resigned in the general resignation of the cabinet on October 16. Dr. Pineda is a former governor of the Department of Bolivar and one-time solicitor general in civil matters. He is reported an affiliate of the Lopez group in Colombia.

Twin River Wildcat Shows for Production

A new, proven Alberta oil field is seen at Twin River where Twin River No. 1 well at 3969 feet in the lime is producing between 50 and 60 barrels a day of light gravity crude oil. This sustained performance of the well, the test of which has been going on for some time but with very little information available, proves the existence of an oil field on the Twin River structure.

The well was drilled by Western Drilling (E. L. Cord) the field lying 50 miles south of Lethbridge and 6 miles north of the Montana border. The well is 10 miles north of the Reagan Tribal well on the Montana side, which found a 5,000,000-foot gas flow and sprayed oil in the Madison lime.

Itatig to Start New Drilling in Brazil

Itatig Oil Company is making arrangements for another rig to start new drilling in State Sergipe, Brazil. The company has completed Socorro 3 in rock salt at 4300 feet. Operators encountered showings in dolomite between 3140 and 3182 feet. These showings were passed up, but will be tested later.

Itatig spudded Socorro 4 in September, drilling into an extremely porous formation at a shallow depth. The well at present is drilling around 2000 feet in Calcareous sandstone with streaks of shale.

Colombia Well to Test

Tropical Oil Company has set 6⅝-inch casing at 7800 feet in its Cimitarra 1 test, middle Magdalena River Valley, Colombia. Shell Oil Company of Colombia's Casabe 1, wildcat on the Yondo Concession, is reported to have been perforated at several levels and has tested a potential in excess of 480 barrels per day.

U. S. FIELD OPERATIONS

Illinois Basin

Cole County Wildcat Has Aux Vases Showing

Aux Vases saturation found in Coles County wildcat; casing set at Wayne County wildcat; Clay County pool opener completed; Clay County wildcat sets casing to McCloskey; White County pool opener near completion.

Coles County: A drill-stem test of Aux Vases sand at 1830-42 ft was being made at Carter's Haybrook 1, E½ SE SW 2-13n-7e, north of Mattoon in wildcat territory; a fair show of oil was reported.

Wayne County: Swan-King Oil Co.'s Spencer 1, C W½ SE NE 28-1s-6e, WOC with pipe on McClosky lime; on drill-stem test at 3166-3219 ft opened 25 minutes 598 ft of oil-cut mud was recovered; Aux Vases at 3040-58 ft carried light show; from an elevation of 464 ft Spencer 1 topped Menard at 2355, Paint Creek at 2896 and Benoist at 2930.

Clay County: John Sanders' J. R. Thompson 1, C N½ NW SE 30-3n-6e, rigging up cable tools to test McClosky saturation; casing set at 2860 ft. The test is five miles west of Flora.

Carter Oil Co.'s A. M. Keller 1, C W½ SW SW 4-2n-5e, completed with initial test of 46 barrels of oil and 10 barrels of water daily from Aux Vases at 2786-89 ft after 80-quart shot.

White County: Sun Oil Co.'s Strow 1, pool opener in SE SE NW 7-4s-10e, putting on pump; swabbed 235 barrels of oil in 24 hours natural from Tar Springs sand at 2540-51 ft.

Reese-Heath's Fred Schumaker Unit 1, SW NW SW 23-4s-9e, four miles south of Centerville field in wildcat territory, drilling below surface pipe.

Saline County: F. M. Summers' Roberts 1, SE SW NE 6-8s-7e, drilling below 3020 ft after unsuccessful test of Aux Vases at 2953-72 ft.

Marion County: Paul Doran's Morgan 1, SE N WNE 12-4n-2e, abandoned; topped Aux Vases 2050, St. Genevieve 2122 ft, Fredonia 2145 ft, total depth 2237 ft.

Perry County: G. H. Blankenship's George 1, NW NE SW 23-4s-1w, drilling 1530, topped Fredonia 1523; Aux Vases at 1289 ft, carried a non-commercial show. There is no production in the county.

Wabash County: O'Meara Brothers' J. C. Utter 2-A, north outpost to Mt. Carmel field, SE NW NE 17-1s-12w, showing for 700-barrel well in McClosky at 2339-44 ft following an acid treatment.

Hamilton County: Cameron Oil Co.'s Lockwood-Smith 1, NE SW NW 24-6s-5e, three quarters of a mile from production in the Rural Hill field, drilling plug to test Aux Vases saturation at 3084-3112 ft.

Indiana

Posey County: Carter Oil Co.'s Maier 1, C N½ NE SW 1-7s-14w, wildcat mile and one half northwest of Mt. Vernon, perforated casing in the Waltersburg sand at 1983 ft, and from one perforation well swabbed 90 barrels of oil in eight hours.

When plug first was drilled to Cypress sand at 2441-77 ft, hole filled with water.

Gibson County: West of Patoka in White River Township. R. D. Brown's Antell 1, C NE SE 20-1s-11w, wildcat south of a small Hardinsburg sand gas well discovered last year, was showing for a pool opener in McClosky at 2262 ft. Four feet of saturation at 2258-62 ft was drilled and hole filled with oil in 30 minutes.

Oklahoma

Three Fields Report Production Extensions

Guthrie field extended; two new wells added West Hotulke pool; Comanche County wildcat encounters oil and salt water; North Davenport pool extended.

Logan County: Sunray Oil Co.'s Donoghue 7, NW SE SE 7-17-1w, extends Guthrie field one location southeast, drilled to 5420 ft in second Wilcox sand, well good for 1200 bbls oil daily.

Pottawatomie County: Smith Brothers Drilling Co. et al's Galbreath 1, SWc 23-9n-4e, extends West Hotulke pool to southeast, further proves possibility of connection with Hotulke proper, well drilled to 4546 ft in Wilcox sand topped at 4536 ft, pumped 100 bbls oil and 36 bbls water in 24 hrs; Atlantic Refining Co.'s Nesbitt 1, SE NW NW 27-9-4e, extends pool southwest, drilled to 4589 ft in second Wilcox sand topped at 4573 ft, well pumped 290 bbls oil and no water in 16 hrs; W. O. Allen's Webber 1, NEc Sec 27, perforated Wilcox sand at 4423 ft for small show, preparing to shoot.

Comanche County: Denver Producing and Refining Co.'s Hayes 1, NEc SW 14-4n-11w, northwest of Elgin drilling at 2625 ft, cuttings of last 200 ft showed sand with shale streaks spotted with heavy oil but showing signs of salt water, test topped Bromide zone 2311 ft, now seeking McLish sand.

Lincoln County: Bryan Petroleum Co.'s Holaday 1, SWc 28-15-5e, extended North Davenport pool location east, drilled to 3486 ft in Prue sand topped at 3478 ft, shot 15 qts, swabbing 15 bbls oil per hr while cleaning out.

Kansas

Lake City Has Oil Show From New Horizon

New producing zone looms for Lake City pool; prospective pool opener's production stops; wildcat in Reno County ready to test saturation; old Odin area reopened; rich new oil pay for Eberhardt pool.

Barber County: Pryor & Lockhart's Gant C-2, C N L NE 18-31s-13w, opens new oil zone for Lake City pool, test drilled to 4541 ft in Simpson dolomite topped at 4528 ft, 7-in on top, drilled plug, swabbing 2 bbls oil per hr, other production in area from Arbuckle dolomite.

Rice County: Westgate-Greenland Oil Co.'s Harder 1, C N½ NW SW 36-20s-6w, midway between Barnholdt and Welch pools, new pool opener 1 mi from production, ceased producing after being put on the pump, operators now preparing to deepen in the chat topped at 3300 ft.

Reno County: Rocket Drilling Co.'s Soper 1, C N½ NE NW 30-25s-4w, 3½ mi northwest of Hilger pool, drilling out cement plug at 3981 ft in Viola lime, wildcat cored saturation in lime zone, may open new production.

Barton County: C. L. Price et al's Lang 1, C E L SE NW 3-17s-12w, has been credited by state officials as reopening production in the old Odin pool, well drilled to 3339 ft in Arbuckle lime was good for potential of 302 bbls daily; Vickers Petroleum Co.'s Herr 1, C N L NE SE 24-19s-11w, opens new Kansas City lime production in Eberhardt pool, drilled to 157 ft in lime zone well swabbed 65 bbls oil and no water in 24 hrs, other wells in pool producing from Arbuckle lime; Helmerich & Payne's Unruh 1, C SW SW 17-20s-15w, new pool opener east of Pawnee Rock, was testing after running tubing, flowed 40 bbls oil in 14 hrs while tubing, through perforations at 3799 ft in Arbuckle lime.

Nebraska

Only One Field Reports Any Drilling Activity

New Barada field only activity in state; Falls City and Shubert fields completely shut down; Lincoln County wildcat abandoned.

Richardson County: Skelly Oil Co.'s Roesch 2, CS½ NW NW 36-3n-16e, in new Barada pool, pumped 577 bbls oil and no water in 16 hrs and was completed; operator's Roesch 3, CW½ SW NW Sec 36, drilled to 2502 ft in Hunton lime topped at 2393 ft, now running squeeze job; operator's Steinbrink 1, CW½ SE NW Sec 36, ready to start; operator's Merz 1, CE½ NE NE Sec 35, building derrick.

Rocky Mountain Area

Gas Show Improves Oil Prospect at Sherard Dome

Substantial flows of gas in the upper sands Sherard Dome improves prospects for developing deep Tensleep oil, while Superior Petroleum Co. spotted location for 9400-ft test on Bunker Hill as Wyoming wildcatting continues to gather momentum under defense pressure.

Sherard Dome: Sinclair-Wyoming Oil Co.'s Mary Carter 1, NE SE SE 31-25n-88w, Carbon County, Wyoming, wildcat added weight to seismic method of study and enhanced chances of de-

veloping deep oil production, developing 6 million ft gas on drill-stem test in Lakota 2958 ft, and 1 million ft Frontier at 1752-1810 ft. Previous tests of Sherard drilled several years ago spotted on surface study were water bearing in Frontier and Dakota series. Test will drill to Tensleep formation expected 6000 ft. Tensleep yields large oil completions Wertz field 8 miles northeast of Sherard.

Bunker Hill: Bunker Hill Dome, proved for gas Frontier series, immediately to northeast of Wertz field, Carbon County, Wyoming, will have 9400 ft test to undrilled Tensleep as Superior Oil Co. (of California) is building derrick for George Brimmer 1, C W L NW NE 32-27n-89w. Ohio's Brimmer 2, SE NW NE 32-27n-89w, gas test to Frontier, setting 8⅝-in csg 83 ft; hole bottoms 110 ft.

Shawnee Area: In Shawnee area, Converse County, Wyoming, semi-proved for nominal shallow production at contact of Tertiary-Cretaceous, Harry Free et al are moving in slim-hole rotary for Flora K. Jeffryes 1, NW NW NW 35-32n-69w. Test is one of several to drill for core information to determine sub-surface of White River overburdened area. Test will go to Shannon as possible oil objective.

South Lance Creek: Drilling 2 miles southwest nearest Lance Creek production, Cow Gulch Oil Co.'s Nelson 1, CSE SW 19-35n-65w, Niobrara County, Wyoming, topped Dakota 4400 ft, Lakota 4565 ft, both dry, and drilling ahead 4657 ft, objective Leo sand 5400 ft, rotary table elevation 4693 ft.

Carbon County Tests: Tops were released on 2 Carbon County, Wyoming, wildcats. Ohio Oil Co.'s Union Pacific 1, NW NE NE 33-20n-81w, Elk Mountain, topped Muddy 4120 ft, Dakota 4221 ft, Lakota 4324 ft, Morrison 4340 ft, and drilling 4610 ft. Surface elevation is 7953 ft, objective Sundance, 5000 ft. Continental Oil Co.'s Johnson-Government 1, SE SW 1-24n-88w, O'Brien Springs, topped Lakota 2940 ft, Morrison 3009 ft, drilling 3177 ft. Rotary table elevation is 6550 ft, objective Tensleep, 5300 ft.

South Tower: Stanolind Oil & Gas Co.'s Snell 1, CSE SW 7-20s-41w, important eastern Colorado wildcat, Kiowa County, 30 miles west Stanolind's new Patterson pool, Kearny County, western Kansas, spudded after several weeks delay to develop water supply, is drilling at 840 ft.

West Texas

Pecos County Test Has Sulphur Water in Delaware

Pecos County Delaware prospect yields water on swabbing test. Permian oil strike in Abell field attracts new development. Production tests under way on wildcats in Winkler, Dawson and Borden counties. Crockett County assigned 6500-foot wildcat.

Pecos County: Pure Oil Co.'s T. P. Land Trust 1-A, extreme west portion county, yielded black sulphur water after drilling plugs from 7-in at 5040 ft with cable tools to 5082 ft. Entered Delaware lime 5055 ft, elevation 3311 ft.

Abell Permian: Stanolind's Rathjen 1, Lot 14, H&GN Sec 26, 3700 ft north and same distance northeast of Simpson production, flowed 759 bbls 37-gravity oil ½-in natural, gas-oil ratio 778/1, giving this most active Pecos County area new oil zone. Production from Tubb section of Permian 3885-3950 ft, elevation 2368 ft. Stanolind starting south offset on S½ Lot 13 on 20 acres purchased last spring at $450 per acre cash. Magnolia's Lutz 1, C Lot 2, Sec 27, will seek ½-mile northeast extension. Magnolia's Grove-State 1, Lot 11, HGN Sec 26, south offset to most easterly Simpson producer, flowed 59.46 bbls 50.1-gravity oil natural ½-in on 6-hour official gauge, Sharp sand 5432-50 ft. Anderson-Prichard Oil Corp.-Stanolind's Wagner 1, C Lot 14, H&GN Sec 23, northwest edge of field, flowed 26 bbls oil hourly ¾-in from Sharp sand perforations 5825-36 ft, total depth 5848 feet.

Conry-Davis Pool: The Texas Co.'s Williams 1, H&TC Sec 15, west offset to discovery, dry after 3, 500-gallon acid treatments via perforations 3948-70 ft, plugged back from 4090 ft. Perforating higher. Sinclair Prairie's Lutz 1, east outpost, yielded sulphur water again when plugged back from 4000 ft to 3970 ft.

Crockett County: J. B. Moncrief and Helmerich & Payne, Inc.'s Couch 1, C NW SE Sec 30, Blk QR, rigging up to drill 6500-foot Permian and Crinoidal lime test on geophysical prospect, involving 2600 acres out of The Texas Company's 5200-acre block. Situated 8 miles southwest of Ozona in area that has experienced considerable lease and royalty trading from majors this year. Stanolind, Pure and Humble supporting the project.

Mitchell County: Humble's Ellwood 1, Ordovician project, resumed drilling after recovering sulphur water on drill stem tests near basal Pennsylvanian 7732-7835 ft and 7820-35 ft.

Yoakum County: Sinclair Prairie's Kleiner 1, 3½ miles northwest of Ownby sector of Waples-Platter pool, unloading through tubing to test promising oil and gas showings 5420-49 ft, 7-in 5400 ft. Top San Andres 4710 ft, elevation 3630 ft. Prospective producing zone equivalent in Permian section to the Slaughter field pay.

Plains Counties: Anderson-Prichard Oil Corp.-Osage Drilling Co.'s Clayton-Pure 1, Borden County wildcat, halted at 4503 ft to run stub liner to test possible oil saturation indicated by electrical log at 4135-45 ft. Top solid lime 3320 ft, elevation 2912 ft. In Dawson County, Ray Albaugh and Richmond Drilling Co.'s Handley 1, 1¼ miles east by north of abandoned wildcat pumper, cleaning out shot cavings after 700-quart shot at 4910-77 ft. Prior to shot swabbing test yielded 35 bbls oil and 5 bbls salt water daily. Harrison & Foster's Steck 1, 3 miles west by north of Lubbock County's pumper, drilling lime 4930 ft. No shows reported.

Winkler Deep: Magnolia's Walton-State 20, wildcat between Kermit and Keystone fields and first deep test for county, recovered sulphur water on swabbing test of perforations 4900-10 ft near base of Tubb section of Permian. Squeezed off to reperforate higher, possibly opposite oil-stained lime 4866-71 ft. Extremely hard chert caused drilling to be halted at 8445 ft, being short of Ellenberger goal, 7-in at 8338 ft.

Winkler Extension: Sam Weiner et al's Halley-Texaco 1-B, near C NW NE PSL Sec 7, Blk B-11, flowed 180 bbls 40-gravity oil 12 hours following 460-quart nitro shot 3005-3217 ft, 7-in 2870 ft, elevation 2797 ft. Situated mile east of Halley pool, which produces 32-34-gravity oil at approximately sea level depth. Deeper pay possibilities gained from The Texas Co.'s Halley 1, SWc Sec 7, which made small pumper September, 1936, following nitro shot 3103-85 ft, having plugged back from water at 3499 ft, elevation 2780 ft. Union Oil of Cal.'s Driver-Amerada 1, C NW NW PSL Sec 19, Blk B-6, projected 4200-foot wildcat east central part Winkler County on short-term acreage farmed out by Amerada, which may later drill Ordovician test on its geophysical prospect in area.

Crane County: Continental Oil Co.'s Jones 1, 1½ miles south of Ellenberger production in Sand Hills field, flowed 83 bbls 42-gravity oil initial 5/16-in choke aided by 8 flow valves, plugged back from sulphur water in Ellenberger 6045-6146 ft to 6015 ft. Production from Sharp sands in Simpson, topped 5545 ft, elevation 2474 ft, and below water table in Sand Hills.

North Texas

Wildcat Failures Reported In Montague County

Montague County wildcat tests water in Mississippian, and Ordovician failure near south line of county. Clay County prospect may test saturation in Ellenberger. Wildcat failure in eastern Baylor County.

Montague County: Continental Oil Co.'s Winder 1, 2 miles east of Stoneburg, eliminated the Mississippian as a possible production source in developing water with nominal show gas, lime 6504-6610 ft, casing 6508 ft. Slater to be deepened to Ellenberger before perforating opposite oil saturation at 6239-51 ft in Bend, topped 6039 ft. Benson Bros. and W. B. Omohundro's Riley 1, 3 miles northwest Sunset, slated to be abandoned in barren Ellenberger 7109-7204 ft. Mississippian and Simpson zones, topped at 6777 ft and 6865 ft, respectively, comparatively thin sections. Bruce Sullivan et al's Johnson 1, 4 miles southeast of Montague and originally carried to 4920 ft by Walter K. Jones et al, successfully cleaned out and drilling 5330 ft on 6500-ft contract. In Clingingsmith pool, Sinclair Prairie's Hobbs 1 drilling shale 5790 ft, and contract let for Clingingsmith 2, north offset discovery.

Clay County: Shell's Maddox 1-A, 8¼ miles northwest of Ringgold, twisted off drill pipe at 5700 ft in Ellenberger, topped 5543 ft. Oil-stained lime 5618-23 ft and streaks broken saturation 5623-84 ft, but probably does not justify running pipe for decisive test. In the Antelope deep pool, Shell's Mullens 7-C, ¼-mile west of its prolific Mississippian pay discovery, considerably lower structurally on all markers below Strawn series than the single deep producer and failure to the east. Mulens 7-C entered Bend 5086 ft, Mississippian 5956 ft and Ellenberger 6102-68 ft, with 4½-in 6166 ft. Will perforate opposite 4 oil-stained lime zones between 5958-6014 ft. Shell's 4-well New York City pool is the only Mississippian producing area that has been consistent.

Archer County: Phillips Petroleum Co.'s Reilly-Pendry 1, 2 miles south

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HOUSTON

West Coast Distributor: WAGNER-MOREHOUSE, INC., Los Angeles

Dundee, drilling 6050 ft in Ellenberger, topped 5273 ft, involving deepest penetration of dolomite in county. Tester used at intervals failed to yield water other than the upper section. The Scotland triple-pay pool steadily enhances its importance, and Shell's Coleman 5-A flowed 123 bbls oil 3 hours via tubing choke, acidized perforations opposite Bend saturation 5077-5108 ft. Flowing production from Strawn sand 3939-57 ft, cased off.

Baylor County: Tom F. Hunter et al's Robertson County 1, 3 miles east of Rendham pool, tested small show oil and water in Canyon 3014-17 ft, and reached main water table in deepening to 3026 ft.

Wildcats: Bruce Sullivan et al's McCoy 1, 4½ miles south Crowell, Foard County, drilling shaley-lime 5875 ft. Drill stem test at 5593-5608 ft yielded show black oil with rotary mud and fresh water. Magnolia's Borden 1, northeastern Jack County, drilling 6590 ft, possibly in Simpson. In Cooke County, W. F. Russell et al's Bundy 1, P. P. Cady survey, abandoned in water 1218 ft, and Lucas and W. F. Russell's Powers 1, H. Nail survey, abandoned at 1304½ ft. Both set pipe on strength of favorable oil showing.

East Texas

Henderson County Strike Makes Good Showing on Test

Henderson County deep strike makes good yield on potential gauge. First Paluxy test on Hawkins Dome disappoints in upper sand. Woodbine wildcats in Van Zandt, Smith and Rusk counties are failures.

Henderson County: British-American Oil Producing Co.'s Young 1 gauged 355 bbls 59-gravity distillate and 31 bbls water with 5,086,000 ft gas on official test through ⅜-inch choke. Production from perforations 7608-41 ft.

Wildcats: Ownby Drilling Co. and E. L. Smith's Bogue 1, Van Zandt County, encountered salt water in Woodbine at 4110-31 ft, coring ahead to explore lower sand. In Smith County, E. L. Phillips et al's McCormic 1 abandoned in Georgetown at 4018-4162 ft, with water in Woodbine topped at 3680 ft. In Houston County, Culmore and British-American Oil Producing Co.'s Lundy 1 awaiting orders at 5016 ft in Wilcox, topped 2084 ft. Side wall cores between 3210 ft and 3223 ft revealed between 5 and 7 ft of slightly saturated sand that may warrant testing.

Wood County: Smith Price, George Prendergast and Roger Lacy's Maberry 3, northeast corner of 51¾-acre lease, S. Castleberry Survey, and on east edge of Hawkins field, drilling 6260 ft in Paluxy sand, topped 6150 ft, elevation 320 ft. The sand is credited with carrying water. This test is the first to explore the Paluxy. The Texas Co.'s Cobb 5, northeast corner of 160-acre lease, J. G. Heard Survey, flowed 85 bbls 22-gravity oil, including 14 percent wash water, the first hour 1-in choke, perforated 4814-40 ft. Logged Woodbine oil sand 4554-4859 ft, elevation 403 ft. Magnolia will make its entry as an active operator in drilling southeast offset to this completion.

Rusk County: O. W. Killam et al's Bass 1, J. I. Sanchez Survey, and 2½ miles north of New Salem, found Woodbine dry at 4265-4372 ft, elevation 414 ft, and plugging back to test source of gas that caused blowout at 2980 ft. M. D. Bryant et al's Ashby 1, 1200 ft northwest of New Salem, or Pleasant Grove pool discovery, flowed oil, water and gas after prolonged swabbing test through perforations opposite Woodbine sand, carrying saturation at 4054-63 ft, 4½-in on bottom at 4086 ft.

Hopkins County: W. B. Hinton and Talco Asphalt & Refining Co.'s Long 1, Ulysses Acquier Survey and 3 miles west of Birthright, scheduled to set pipe for production test in Paluxy 4741-4857 ft. Situated on the Mexia-Talco fault trend, this wildcat afforded some promise of making an oil producer when drill-stem test at 4699-4757 ft yielded oil-cut mud.

Southwest Texas

Wilcox Wells Hold Lower Coast Interest

Wilcox operations again top important Southwest Texas developments. Seventh field in this zone opened to give Shell Oil Co. a 100 percent record in 3 wildcat prospects to this horizon.

Wilcox Trend: Shell's Neuhaus, Ragsdale sur, 3 mi s Vienna fld, Lavaca County, set 5½ in cas abt 10,150 ft, prep to test shows in Wilcox between 10,080 and 8500 ft. Would be new pool.

Quintana Petroleum Co.'s Washburn 1-B, 6265 ft sw Washburn pumping disc, LaSalle County, dr to 5700 ft, set 5-in cas 5698 ft, dual sd well, perf 5530-50 w/286, f 405.72 bpd 40.3 gr plo ¼ ch, 525 lbs wp, gor 425-1; perf 4822-32 w/72, f est 20,000 mcf wet g open, SIP 1480 lbs; test thru ¼ ch rec g and dist, 1180 lbs tp, 1350 lbs cp. Expands fld, new sd.

Lower Gulf Coast: Moore & Ahern's Badet 1, 1 mi se strike N. LaWard fld, Jackson County, crd sd 18 ft low, set 5½ in cas 5270 ft, prep to dr plugs.

Gulfboard and Salt Dome's Dickey 1, 1 mi sw N. LaWard fld, perf 5216-24 ft, f o, but gor high, sq, prep to reperf.

E. M. Jones' Olsovsky 1, ¾ mi ne N. LaWard fld, crg 5200 ft sd.

Geo. B. Buescher et al's J. R. Knight 1-A, N. Luby fld, Nueces County, perf 6959-64 ft, f 76, 5 bpd 44 gr plo ⅛ ch, 1920 lbs tp, 2840 lbs cp, gor 4880-1; new sand.

Seaboard Oil Corp.'s S. L. Lane 4, Odem fld, San Patricio County, perf 3341-46 ft, f 2500 mcf g, 5 bpd 56 gr dist ¼ ch, 1350 lbs tp, 1425 lbs cp; new sd.

Cox & Hamon's Balli 1, Cologne fld, Victoria County, perf 4640-42 ft, f 77.28 pbd plo 7/64 ch 1250 lbs tp, 1740 lbs cp, gor 1450-1. New sd.

Wellington Oil Co.'s Lane 2, Odem fld, San Patricio County, dst 4397-4405 ft rec no fluid dev 440 lbs ¼ and ⅜ ch, 4 min, new sd. Dr ahead to regular sd for comp.

La Gloria Operators Committee's South Unit 1, set 7 in cas 6900 ft. Extending La Gloria fld, Brooks County, ½ mi sw.

Joe Stelzig et al's Truslow et al 1, n outpost, S. White Crk fld, Live Oak County, dr to 1800 ft cont, ran electric log, no shows, abd.

Texas Gulf Coast

New Wilcox Test Staked In Lake Creek Area

New location staked in Lake Creek area, Montgomery County; casing set in Jefferson County wildcat.

Wilcox Trend: Superior Oil Company has staked McWhorter 1-C southwest of Lake Creek field, Montgomery County. It is 505 ft south and 775 ft west of McWhorter 1-B, latter well drilled to 13,330 ft, but completed in perforations 9778-98 ft in top Wilcox.

Stanolind & Amerada's McWhorter 1, Lake Creek, has set casing 10,660 ft and will make production tests this week.

In Fostoria area, Montgomery County, Atlantic's Foster Lumber 1, is testing with liner set at 10,608 ft.

Jefferson County: Stanolind's Anderson 1, deep test on northwest flank Big Hill Dome, cemented casing at 8499 ft. Total depth is 8711 ft. Well will be drilled deeper, no production tests planned now.

Wildcats: H. L. Hunt, Dallas, has staked Moore Est. 1, north of Rosenberg, Fort Bend County. Located on Magnolia Petroleum farmout acreage, well will be in B.B.B. & C. sur, abstract 139.

Republic Production & Houston Oil have staked Cushing-Fee 1, 1½ mi southwest Joe's Lake field, Tyler County. Location is 1 mi south of Smith-Fee 1, now drilling in side-tracked hole. Rowan Drilling is rigging up to drill Land 1, south Anahuac field, Chambers County.

Louisiana Gulf Coast

Deep Well in Neale Field Will Drill to Midway

Well in Neale field to drill to Midway formation; Rapides Parish wildcat tests salt water again.

Beauregard Parish: Atlantic Refining's Hawkins 1, Neale field, is drilling below 11,819 ft, deepest well yet drilled in field. Company will try to drill hole through Wilcox to Midway formation. Well has encountered all deep sands found in Musser-Davis 5, deep discovery completed at 11,175 ft thru perforations 10,880 ft.

Rapides Parish: M. H. Marr's Eota Realty Company 1, Wilcox test in South Catahoula Lake area, tested water through perforations 5786-88 ft. Previously it tested perforations 5786-90 ft, showing 45.6-gravity oil, later going to water. Wilcox topped 3962 ft, section showing 5 sands on log. Total depth 7068 ft.

Calcasieu Parish: Gulf Refining's Calcasieu National Bank 2, east blowout well on Hayes prospect, drilling below 11,117 shale. Union Oil of California's Gray 1, 10,300-ft wildcat in Bayou Guy area, northeast Moss Lake prospect, drilling below 7089 ft shale.

St. Martin Parish: Davis & Co.'s Voorhies 3, east flank Anse la Butte dome, testing thru perforations 9741-60 ft. Total depth 9802 ft in side-tracked hole.

North Louisiana

Six Locations Made for Catahoula Wildcat Tests

Catahoula Parish most active area in the Olla Trend with three of week's six wildcat locations staked there; second test in North Lisbon seeking Smackover lime production below 10,000 ft; Bossier gets wildcat operation.

Catahoula Parish: Three wildcat locations were staked and one wildcat abandoned in Catahoula Parish last week. Wildcats will be drilled by Carter Oil Co. and Phillips Petroleum Co., H. L. Hunt, and S. H. Calvert. O. C. Borah's Womack 1, irregular Section 54-9n-5e, abandoned at 5570 ft.

North Lisbon: Union Producing Co.'s McDonald 1, SW 13-21n-5w, Claiborne Parish, second Smackover lime test in north Lisbon, drilled below 10,000 ft. Discovery well of same company in C NE 18-21n-4w, completed as gas-distillate well at 10,392 ft.

Wildcats: H. L. Hunt abandoned Goodpine F-11, SE NW 35-10n-3w, Winn Parish wildcat in Olla trend at 3980 ft and same operator abandoned Goodpine F-14, SW NW 36-13n-6w, Natchitoches Parish, at 5790 ft. There were few locations in proven fields during week but one location staked in Lake Larto and Cypress Bayou fields, both recently discovered in Olla Trend.

Arkansas

Erratic Fouke Field Has 340-Barrel Well Flowing

West edge well at Fouke, Miller County, completed flowing, as best well of field; three new locations staked in East Schuler; deep test at Hibank, southeast of El Dorado started; ninth well looms in Smart (Travis Peak) horizon at Stephens.

Miller County: The best well so far completed in the erratic Paluxy sand field at Fouke was completed last week by Carter Oil Co. at Sturgis 6, NE SE 3-17-27, flowing 340 barrels oil daily through 3/16-inch choke, casing and tubing pressures equalized at 225 pounds; total depth 3760 ft. Most wells in this field previously have had to be pumped.

East Schuler: Three new location staked in East Schuler, Union County, as sequel to recently completed second producer there. Two of new tests are operations of Atlantic Refining Co.

Stephens: The ninth oil well in the Smart sand (Travis Peak) at 3400 ft, recently found productive, looms at Stephens, in Crow, Turner and O'Farrell's J. W. Smart 3, NE SW SW 12-15-20, now being standardized. Test is northeast of discovery well and producing trend appears north and east as failures have been completed to south and west.

Two Fields to Be Developed: Two new Smackover lime fields, recently discovered in South Arkansas, have yet to have their second tests. One is the Patton field, LaFayette County, six miles west of the McKamie field, and the other is the new Mount Holly field, Union County. In the latter, Atlantic and Phillips' Davis 1, NE NW 15-17-18, completed in Smackover lime after perforating at 7166-68 ft, is flowing 11 barrels per hour through choke.

California

Leasing Active Near Fresno County Strike

Leasing active in area new Fresno County discovery; Kern County test abandoned, new operator takes over large block in another area; new extension test slated in Los Angeles County.

Fresno County: Shell Oil Co., Standard Oil Co., Richfield Oil Co., Union Oil Co. and General Petroleum Corp. are leading in a leasing race in the new Helm-Cloverdale area where Amerada Petroleum Corp. discovered a new field last week, with at least five other companies also actively bidding for property. Interest centers in T. 14-R. 14 and T. 15-R. 15.

Kern County: Shell Oil Co. has abandoned Smith-Cairns 2, Dyer Creek area, 11-26-27, after bottoming in gray sand at 2491 ft. Top of the Vedder was placed at 2287 ft.

J. Paul Getty has acquired a group of leases in the Edison area recently accumulated by Independent Exploration Co., centering around sections 4-, 5-, 6-, 8-30-29, and is expected to stake location for a test in the near future.

Los Angeles County: Location for a wildcat test has been staked in the Hasley Canyon-Del Valle area, sec 9-4-17, approximately a mile west of The Texas Co.'s Fernando 1 wildcat, now drilling in sandy shale at 4513 ft.

Michigan

Start Test to St. Peter In Grand Rapids Pool

First St. Peter sand test in Grand Rapids shallow pool ready to start. Osceola County wildcat carries oil-gas show in Traverse.

Southwest Area: Deep Well Corp.'s Riddering A-1, C E SE SE 30-7n-12w, Grand Rapids field, was to spud this week marking first attempted penetration of 5000-ft St. Peter sand in field, developed in 1939-40 for 1700-ft Traverse production.

First attempt to acidize Clapsaddle and Harris' Malstrom 1, Section 19-1n-15w, Allegan County, failed after wildcat had flowed and swabbed for indicated natural production 10 to 14 barrels day. Production is from 1170 ft in Traverse.

Wildcats: Sun Oil Co.'s Richardson 1, Section 15-18n-9w, Osceola County, carried 200 ft of oil and 2500 ft of water in Traverse lime at 3306 ft and was to be carried to 3700 or better for Monroe lime penetration. Sun was reaming at 3852 ft on Bauman 1, Section 29-24n-1w, Roscommon County, where Monroe lime showed at 4188 ft. Casing will be re-set for production test.

Reed City: Rose & Swanson's Skidmore 1, Section 15-18n-11w, Lake County, 3 miles northwest of production in Reed City field, logged Dundee lime 3675 ft and drilled horizon dry for abandonment at 3800 ft. Ohio Oil Co. is still testing Peiser 1, Section 6-18-11w, with a combination water-oil pay at 3640 ft.

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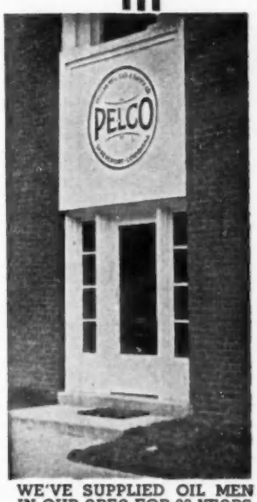

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UNITED STATES WELL COMPLETIONS

Arkansas

Company, Well and Location	Init. Prod. Bbls.	Depth
Miller County (Fouke)—		
Carter Oil Co., Sturgis 6, 3-17-27	340	3760
Union County (Wildcat)—		
Atlantic et al, Davis 1, 15-17-18	528	7373
Union County (Urbana)—		
Delta Drlg. Co., Nelson 1, 36-17-15	*	3830
Marine Oil Co., Union Sawmill Co. B-3, 2-18-13	¶22	3260

California

Company, Well and Location	Init. Prod. Bbls.	Depth
Fresno County Kettleman North Dome)—		
Standard, 324-35 J	176	10446
Fresno County (Raisin City Area)—		
Bandini Pet. Corp., S.P. 82-23	*	6546
Kern County (Coles Levee)—		
Richfield, KCL-C 38-27	2000	9241
Kern County (Devils Den Area)—		
R. D. Herzog, Marine 31	8	200
Miesse & McCabe, Jacquilyn 3	10	470
Kern County (Edison)—		
Jergins Oil Co., Fee 13-4	220	1513
Kern County (Mount Poso)—		
Vedder Pet. Corp., Ltd., S.P 7	30	1401
Kern County (Richgrove Area)—		
Shell, Smith Cairns 2	*	2491
Los Angeles County (West Coyote)—		
Severns Dr. Co., McNally 5	75	4190
Los Angeles County (Del Valle)—		
Bankline Oil Co., Videgain 101	208	7700
Los Angeles County (Dominguez)—		
Shell, Reyes 127	163	6270
Los Angeles County (Newhall Area)—		
St. Anthony Oil Corp., Lassale 1	*	5416
Los Angeles County (Newhall-Potrero)—		
Barnsdall, R.S.F. 27	1621	7301
Los Angeles County (Wilmington)—		
Union Pacific, U.P. 205	238	3450
U P 208	298	3548
U.P. E-37	57	3975
Orange County (Huntington Beach)—		
H. S. Kuhlbush, Pacific American 8	130	4644
H. C. Morton, Brooks 3	135	4797
Santa Barbara County (Santa Maria Valley)—		
R. R. Bush & Hancock Oil Co., Bradley 7	No Est.	4784
Solano County (Rio Vista)—		
Standard, Midland Fee 2-1	16159Y	3992
Ventura County (San Miguelito Padre Canyon)—		
General, Padre 2	154	5710
Ventura County (Shiells Canyon)—		
Security L&R Co., Calumet-Security 1	58	3199
OLD WELLS DEEPENED		
Los Angeles County (Long Beach)—		
Shell, Wells 4 (otd 4918)	48	5727
Los Angeles County (Wilmington)—		
Pacific Western Oil Co., Rush Comm. 1 (otd 2566)	125	3520
Royalty Service Corp., Nelson B-4 (otd 2775)	80	3499

Colorado

Company, Well and Location	Init. Prod. Bbls.	Depth
Moffat County (Hiawatha)—		
Mountain Fuel, Wilson 9, ne se ne 22-12n-100w	¶10	2841

Illinois

Company, Well and Location	Init. Prod. Bbls.	Depth
Champaign County—		
Carl Robinson, Springer 1, c nw nw sw 18-22n-8e	*	1404
Clay County—		
Regent Oil, Trotter 1, se se sw 29-3n-8e	*	3100
Lain Oil & Gas Co., Aldrich 1, n½ ne se 26-4n-5e	*	2838
Dee Miller et al, Palmer 1, sw nw sw 35-4n-7e	53	2610
Clinton County—		
Newton & Ward, Cross 5, sw se sw 5-1n-3w	30	999
J. McNeil, Knolhoff 3, ne nw sw 11-1n-2w	6	1182
Browning & Jones, Lampen 1-A, ne ne nw 16-1n-2w	*	1206
Douglas County—		
Ill.-Mid-Continent, Bragg 1, c ne nw ne 33-16n-9e	*	700
Edwards County—		
Superior, Fewkes 4, se sw sw 7-2s-11e	20	3115
N. K. Menefee, McDowell 1, s½ se ne 31-1n-11e	*	3299
Central Pipe Line Co., Kent-Stremme 1, e½ se ne 31-2n-14w	1504	3123
Fayette County—		
Jarvis Bros. et al, Yakey 1-D, e½ nw se 6-7n-3e	*	3237
Carter Oil Co., Wetmore 3-D, c sw nw 11-8n-3e	250	3140
Miller 2, nw ne ne 16-8n-3e	306	1516
Boles 7-D, c nw sw 21-8n-3e	250	3098
Mills 12-D, c se sw 28-8n-3e	250	3096
Mills 13-D, c w½ sw sw 28-8n-3e	250	3057
Ireland 3-D, c e½ se se 29-8n-3e	125	3029
Franklin County—		
Carter Oil, U. S. Coal & Coke Co. 1, sw se nw 20-6s-4e	*	3265
Smokey Oil Co., Thomas 1, sw ne ne 1-6s-2e	*	2903
E. S. Adkins, Whaley 1, se sw se 35-5s-2e	*	2904
C.W.&F. Coal Co. "W" 4, sw nw se 36-6s-2e	190	2122
C.W&F. Coal Co. "W" 11, se nw se 36-6s-2e	210	2126
T.M. McKemie "A" 2, sw nw sw 30-6s-3e	120	2132
Gallatin County—		
Carter Oil, Rister 2, sw sw nw 4-8s-8e	*	1950
Hamilton County—		
Magnolia, Sloan 2, nw se nw 13-6s-5e	487	3410
Sloan 3, se se nw 13-6s-5e	800	3385
Cameron, Lockwood 3, ne se nw 23-6s-5e	58	3122
Texas, Lockwood 3, ne sw nw 13-6s-5e	205	3320
Hicks 1, e½ nw se 27-6s-6e	189	3095
Irvin 3, c w½ ne se 27-6s-6e	150	3095
Irvin 4, se ne se 27-6s-6e	95	3093
McGill 1, e½ ne sw 27-6s-6e	679	3089
Pure, Cuppy 20, nw nw nw 7-6s-7e	180	3015
Jasper County—		
Walsh & Dye, Hayes-Sutton 1, c sw se sw 5-6n-10e	64	2808
Texas Co., Hines "B" 1, e½ sw ne 7-6n-10e	*	2861
Jefferson County—		
Texas, Rosenburger 1, se ne nw 35-2s-1e	82	2003
Walker 7, sw sw ne 2-3s-1e	49	1958
Magnolia, Kaninski Est. 1, nw ne se 2-3s-1e	312	1961
Kaninski Est. 2, ne ne se 2-3s-1e	492	1958
Lawrence County—		
C. Evarts, Speidel 2, ne ne nw 26-2n-12w	83	1404
Marion County—		
C. C. Nye, Long 1, c w½ nw nw 27-3n-4e	*	2684

[*Continued on Next Page*]

*Failures; †Junked; ¶Million cu. ft. gas.

Summary of Drilling Operations in the United States, Week Ended November 15, 1941

	WELLS COMPLETED								PERMITS FOR NEW WELLS				
	Total for Week	New Wells Drilled for Oil and Gas: Oil Wells	Gas Wells	Failures	[3]Miscellaneous	Initial Production	Total 1941	Total this Date 1940	This Week	Total this Month	Total 1941	Total this Date 1940	Year Total 1940
Alabama	.....	.....	.....	.....	.....	.....	5	9	.....	.....	.....	.....	.....
Arkansas	4	2	1	1	....	868	171	160	9	12	169	135	153
California	25	21	1	3	....	5,774	1,042	993	21	47	1,047	996	1,042
Colorado	1	.....	1	....	....	.....	17	8	....	.....	.....	.....	.....
Florida	.....	.....	.....	....	....	.....	1	2	....	.....	.....	.....	.....
Georgia	.....	.....	.....	....	....	.....	1	.....	.....	.....	.....	.....	.....
Illinois	97	69	1	22	5	19,568	3,528	3,564	94	198	4,240	4,066	4,532
Indiana	11	2	2	7	....	110	483	463	10	25	[2]254	.....	.....
Iowa	.....	.....	.....	.....	.....	.....	6	.....	.....	.....	.....	.....	.....
Kansas	34	20	1	10	3	21,895	1,982	1,786	39	75	2,072	1,828	2,048
Kentucky	7	4	1	2	....	291	289	328	7	16	[2]173	.....	.....
Louisiana	42	25	3	14	....	5,754	1,379	1,512	27	58	1,550	1,479	1,658
Michigan	21	15	3	3	....	6,825	748	1,093	31	53	843	993	1,093
Mississippi	7	6	....	1	....	2,536	191	167	....	.....	.....	.....	.....
[1]Missouri	.....	.....	.....	.....	.....	.....	64	26	....	.....	9	24	26
Montana	11	8	1	2	....	987	200	173	....	.....	.....	.....	.....
[1]Nebraska	3	2	....	....	1	896	84	28	2	3	91	53	69
New Mexico	5	4	....	....	1	1,635	349	582	13	17	367	507	559
New York	36	17	....	....	19	127	913	880	....	.....	.....	.....	.....
Ohio	45	15	20	7	3	1,062	1,564	946	....	.....	.....	.....	.....
Oklahoma	34	12	1	16	5	4,397	1,931	1,890	45	96	2,086	1,651	1,888
Pennsylvania	11	1	8	2	....	5	3,313	3,104	....	.....	.....	.....	.....
South Dakota	.....	.....	.....	....	....	.....	.....	1	....	.....	.....	.....	.....
Tennessee	.....	.....	.....	....	....	.....	16	11	....	.....	.....	.....	.....
Texas	177	124	5	44	4	50,384	9,221	8,834	164	310	10,627	9,914	11,170
Utah	.....	.....	.....	....	....	.....	3	3	....	.....	.....	.....	.....
West Virginia	27	5	18	2	2	242	671	543	....	.....	163	707	782
Wyoming	.....	.....	.....	....	....	.....	118	138	....	.....	.....	.....	1
Total this week	598	352	67	136	43	123,356	28,290	27,244	462	910	23,691	22,354	25,021
Total last week	601	380	65	130	26	178,256	27,692	26,685	448	448	23,229	21,885	25,021
Total this year	28,290	17,230	2,235	6,206	2,619	7,822,804	.....	.....	....	.....	.....	.....	.....

[1] This tabulation includes those states where weekly data are available; figures for Missouri date from August 10, 1940; Nebraska from August 3, 1940.
[2] No data available before June 14, 1941.
[3] Includes old wells deepened, water-intake, gas input, and salt water disposal wells.

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
Richland County—		
Kentucky Natural, Tezault 3, s½ se ne 12-4n-11w	¶6.5	1073
R. D. Martin, Diescher 1, w½ nw sw 26-2n-10e	*	3331
Pure Oil Co., Lucas 1, sw ne ne 25-4n-9e	27	2992
Benefiel 2, c s½ nw nw 9-5n-10e	87	2815
Ohio, Lambert 1, s½ se nw 17-2n-14w	90	3149
Shelby County—		
R. J. McFarland, Cozalet 1, se se se 6-12n-2e	*	1475
St. Clair County—		
Lee & Loverns, Metter 1, Lot No. 43, 27-1n-10w	15	554
Tarleton Oil Co., Reichert 3, sw sw sw 27-1n-10w	150	719
Wabash County—		
Magnolia, Alka 2, nw se sw 34-1s-13w	35	2700
William Bailor, Friend 5, sw se nw 21-1s-12w	*	1491
Dean & Morton, Hein 1, sw sw se 21-1s-12w	200	1993
Olds et al, Spoole 1, ne se sw 21-1s-12w	160	1994
Continental Oil, Cowling 4, ne se sw 17-2s-13w	403	2798
T. C. Knight, Hoffman 1, sw nw ne 29-2s-13w	*	1760
Seaboard, Stevens 1, nw sw ne 16-1n-12w	24	2352
Wayne County—		
Jack Chevigney, Shaffer 1, w½ ne se 30-2s-9e	50	3382
Wiser, Vaughaan 2, w½ ne ne 1-1s-6e	*	3318
Hilliard 1, s½ se sw 23-1n-6e	200	3192
Olson Drilling Co., Oglesby-Hopkins 2, e½ ne nw 3-1s-6e	500	3231
Clay 1, s½ nw se 35-1n-6e	*	3378
Pure Oil, William Ulm 2, e½ sw ne 1-1n-7e	81	3052
Harrington "B" 3, e½ ne se 11-1n-7e	51	3101
Hosselton "B" 2, e½ sw se 28-2n-8e	24	3105
Benskin "B" 1, n½ nw se 31-2n-8e	83	3030
United Produc. Co., Cariens 4, n½ nw sw 35-1n-6e	363	3205
Watson 1, n½ sw ne 35-1n-6e	186	3208
Porter 2, e½ se se 36-1n-6e	269	3277
R. O. Smith, Galbraith 2, s½ sw se 22-1n-6e	1650	3215
Texas Co., Bullard 1, s½ se nw 22-1n-6e	*	3290
Wilson 1, s½ ne se 22-1n-6e	672	3200
Shultz 1, s½ se ne 28-1n-6e	161	3121
Shultz 4, n½ ne ne 28-1n-6e	1341	3223
O'Mera et al, Evans 1, n½ ne sw 32-1n-6e	*	3252
Hoosier Drlg. Co., Cisne 1, s½ sw sw 25-1n-6e	*	3220
Ill.-Mid-Cont. Oil Co., Watson-Wells 1, s½ sw se 26-1n-6e	1946	3144
Ohio, Leathers 2, n½ se sw 26-1n-6e	144	3240
White County—		
Longhorn, Helm 23, sw se ne 22-3s-14w	255	2655
First Nat'l. Petrol., Bump 6, nw sw nw 33-3s-14w	418	2930
H. H. Weinert, Miller-Andrews 7, c sw ne ne 30-3s-8e	300	3238
Mabee Oil & Gas, Smith 7, se sw se 4-4s-14w	173	2833
Superior, Fitton 29, se ne nw 23-4s-14w	71	2882
Ford 2, sw nw sw 23-4s-14w	170	2660
Given 16, ne nw sw 34-4s-14w	180	2839
Greathouse "A" 4, c ne ne sw 34-4s-14w	78	2890
Magnolia, Wm. Cox 3, sw ne se 5-4s-14w	325	2938
Sisson-Higgins 9, ne nw se 24-6s-10e	45	2270
Cherry, Kidd & Lambert, Karch 8, nw nw se 13-6s-10e	10	2026
McElvain Bros., Poole-Parr 2, sw sw ne 13-6s-10e	17	2031
Carter Oil, Welch 1, se sw sw 11-7s-8e	401	2904
Hiawatha Oil, Stinson 6, ne ne ne 19-7s-11e	80	2463
OLD WELLS DEEPENED		
Hamilton County—		
Kingwood, Johnson 4, sw se ne 14-6s-5e (otd 3132)	400	3229
Lawrence County—		
Ullon, Barnett 1, ne nw nw 8-2n-11w (otd 1884)	13	3410
Marion County—		
Texas Co., Corbin 7, sw se ne 31-2n-2e (otd 3335)	92	4590
Dunning 14, ne nw se 31-2n-2e (otd 3340)	70	4585
Wayman 27, sw sw ne 31-2n-2e (otd 3369)	69	4586

Indiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Decatur County—		
Hoosier Public Utilities, Wells 231, c n½ sw nw 11-9n-9e	¶170.354	893
Elkhart County—		
Petro. Expl. Co., Woodard 1, c s½ ne sw 25-38n-4e	*	560
Harrison County—		
Harrison Dev. Co., Jennings 1, sw ne nw 7-4s-4e	¶30	930
Posey County—		
Continental Oil Co., Kleiderer "A" 16, sw se ne 33-3s-14w	100	2899
E. S. Taxman, Luigs 1, sw nw se 14-5s-12w	*	1198
Joe Dawson et al, Allyn 1, se sw sw 19-6s-12w	10	1125
Hollandsworth et al, Seifert 1, se sw sw 19-6s-12w	*	1129
Pulaski County—		
Anderson, Overmeyer 1, e½ w½ se 4-29n-4w	*	663
Spencer County—		
Jess Wilson, Miller 1, sw ne ne 6-7s-7w	*	1059
Sullivan County—		
O. A. Thayer, Springer 1, c s½ se ne 12-7n-10w	*	626
E. L. Shoudy et al, Wible 1, sw ne nw 13-8n-10w	*	820

Kansas

Company, Well and Location	Init. Prod. Bbls.	Depth
Barton County—		
Derby, Bernsdorf-Janke 7, nw ne ne 33-16s-11w	303	3365
Bartlett et al, Moran 1, c n½ nw nw 25-17s-11w (pb 3318)	350	3321
Magnolia, Roetzel 8, c s½ sw ne 25-20s-11w	2388	3275
Phillips Pet., Scheufler 1, c e½ ne se 24-20s-12w (pb 3233)	*	3392
Butler County—		
Cities Service, Wilson 206, se se ne 8-25s-5e	99	2035
Cowley County—		
Phelps & Spencer, Dumber 2, sw ne sw 29-30s-5e	*	2940
Elk County—		
McPherson et al, Clogson 1, sw se se 21-28s-11e	*	1170
Ellis County—		
Champlin, Hadley "B" 4, c n½ ne sw 29-11s-17w	108	3560
Darby, Polifka 1, c s½ se se 18-13s-17w	*	3725
Ellsworth County—		
Bartlett et al, Adamek 1, ne ne nw 5-16s-10w	*	3355
Gulf, Svoboda 4, c w½ se se 8-16s-10w	295	3376
Graham County—		
R. W. Shields, Belveal 1, c e½ se ne 9-8s-24w	*	4319
Greenwood County—		
T. A. Simmons, Ellis "C" 5, nw se ne 27-23s-11e	*	2065
Marion County—		
Rex & Morris, McCoy 1, c n½ ne ne 14-17s-4e	*	2430
McPherson County—		
Nadel, Gussman et al, Gratton 5, 220 ft e of c w½ sw 24-19s-2w	25	2963
Rice County—		
Skelly, Grizzell 1, se sw sw nw 9-19s-9w	3000	3250
Mabee, Miller 4, c w½ nw ne 9-20s-9w	807	3241
Aladdin Pet., Lackey 1, c w½ sw se 1-21s-6w	278	3366
Russell County—		
Helmerich & Payne et al, Jennrich 1, c w½ nw se 13-12s-15w	*	3362
Holl 5, c e½ se nw 22-14s-14w	389	3130
El Dorado Ref., Mohl 1, se se se 18-14s-13w (pb 3238)	153	3258
G. A. Stearns, Opdycke 3, c s½ sw sw 20-14s-13w	361	3015
R. H. Shields, Rogg 4, c s½ sw sw 28-14s-13w	146	2951
Phillips Pet., Carrie 2, c w l sw se ne 18-14s-14w	1219	3123
Darby, Boxberger 4, c e½ nw se 22-14s-14w	2536	3079
Cities Service, Rogg "D" 5, 280 ft e of c ne 9-15s-13w	3000	3058
Wolf-Creek, Donavan "B" 1, c s½ se se 10-15s-15w	*	3325
Sedgwick County—		
Continental, Goodrich 6, se nw sw 16-25s-1e	57	3334
Stafford County—		
W. O. Allen et al, Elfsten 1, ne nw nw 7-22s-14w	*	3930
Nelson Drlg. et al, Hitz 1, se se nw 4-24s-12w (pb 3880)	¶6.399	4032
Stanolind, O'Conner 1, c s½ sw nw 11-24s-12w	3000	3832
OLD WELLS DEEPENED		
Kiowa County—		
G. R. Burke, Brazell 1, 180 ft n of ne ne ne 33-7n-17w	*	1111
Russell County—		
Stanolind, Krug "B" 1, c n½ n½ se 27-14s-14w (otd 2978)	376	2039
Stafford County—		
Stanolind, Martin 4, se ne nw 14-24s-11w (otd 3805)	3000	3833

Kentucky

Company, Well and Location	Init. Prod. Bbls.	Depth
Butler County—		
Rex Pyramid, Miller 1, 11-H-37	*	1472
Daviess County—		
Shaffer, Burns 1, 15-N-29	*	900
O. D. Vickers, Johnson 3, 17-N-29	190	1437
Schneider & Gwin, Overfield 5, 25-O-25	3	650
Overfield 6, 25-O-25	8	659
McLean County—		
Cameron & Son, Kerrick 4, 4-M-28	90	1696
Ohio County—		
John Tuttle, Miles 2, 19-N-34	¶250	275

South Louisiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Calcasieu Parish (Starks)—		
W. T. Burton, Industrial Lumber 4	*	7439
Cameron Parish (Chalkley)—		
Shell, Laccassine 2-B	36	10130
Cameron Parish (East Hackberry)—		
Harrison & Abercrombie, Doiron 2	519	7365
Evangeline Parish (Pine Prairie)—		
C. & I. Production, Evangeline Land 3	681	8296
Evangeline Parish (Ville Platte)—		
Continental, Hirsch 8	322	10238
Ludeau, Tr. 2	182	10228
Tate 3, Unit 27	*	10129
Tate-Becker-Fontenot 1, Unit 33	*	10290
N. Hirsch 3-B	243	10145
R. A. Irwin, Isaac Johnson 3	275	10187
Iberia Parish (New Iberia)—		
Texas Co., Gralino 5	419	6291
Iberville Parish (Bayou Blue)—		
Union Sulphur, Schwing Lbr. & Shg. 4	*	6312
Iberville Parish (St. Gabriel)—		
Shell, Natalbany Lbr. 3	295	9155
Iberville Parish (Whitecastle)—		
Shell, Wilbert & Sons 19	70	4673
Jeff Davis Parish (Woodlawn)—		
Union Sulphur, Racca 3	*	10109
LaFourche Parish (Golden Meadow)—		
Temple Hargrove, Gaspard-Rizan 8	175	5673
Plaquemines Parish (Wildcat)—		
Phillips, LLE-Fee 1	65	10170
Plaquemines Parish (Quarantine Bay)—		
Gulf, State-Quarantine Bay QQ 30	565	8576
Plaquemines Parish (West Bay)—		
Gulf, Buras Levee District 7-E	227	7344
J. G. Timolat 4-B	236	7400
St. Charles Parish (Paradis)—		
Texas Co., Kate Pareti 1	432	10383
St. Martin Parish (West Lake Verrette)—		
Shell, Breaux Lbr. Co. 7-A	17	3500
St. Mary Parish (Bateman Lake)—		
Texas Co., Wax Bayou 6	¶	10996
St. Mary Parish (Belle Isle)—		
Sun, State 2	*	987
Terrebonne Parish (Caillou Island)—		
Texas Co., Caillou Island 71	*	9350
Vermilion Parish (Erath)—		
Texas Co., R. S. Henry Est. 1	240	11599
Vermilion Parish (South Gueydan)—		
Union Sulphur, J. Baker 3	*	11165

North Louisiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Caddo Parish (Pine Island)—		
J. W. Bailey, Muslow 7, 31-21n-15w	40	1570
Davis & Hart, Muslow A-6, 5-20n-15w	100	1503
Stanolind, C. W. Lane 3, 13-21n-15w	75	1650
Caddo Parish (Vivian-Pine Island)—		
Valley Osage Oil Co., Robertson 1, 33-22n-15w	*	2450
Catahoula Parish (Wildcat)—		
O. C. Borah, Womack 1, 54-9n-5e	*	5570
LaSalle Parish (Olla)—		
Placid Oil Co., Louisiana Central 115, 35-10n-2e	160	2405
Louisiana Central 116, 23-10n-2e	30	2395
LaSalle Parish (Little Creek)—		
Placid Oil Co., Tremont Lbr. Co. A-14, 24-9n-1e	160	2750
LaSalle Parish (Nebo)—		
H. L. Hunt, Goodpine F-68, 10-7n-3e	190	4312
Goodpine F-121, 37-7n-3e	*	5200
LaSalle Parish (Trout)—		
Big West Drlg. Co., Whatley 1, 25-8n-2e	¶10	3928
Natchitoches Parish (Wildcat)—		
H. L. Hunt, Goodpine F-14, 36-13n-6w	*	5790
Ouachita Parish (Monroe)—		
Hope Prod. Co., Pace 1, 11-19n-3e	¶15	2170
Sabine Parish (Zwolle)—		
A. R. Chestnut, Thomas 1, 4-8n-13w	*	2275
Winn Parish (Wildcat)—		
H. L. Hunt, Goodpine F-11, 35-10n-3w	*	3980

United States Well Completions—*Continued*

Michigan

Allegan County—
Muskegon Oil Corp., McDermott 1, se nw nw 18-3n-12w ..... * 1634
Fisher-McCall's Wamhoff 1, se ne nw 18-3n-12w 100 1552
Arenac County—
W. E. Ross, Goodroe 1, c sw 17-19n-4e ..... ¶½ 1540
Bay County—
Gulf, Macey 1, sw nw sw 34-15n-4e 35 2943
Clare County—
Rowmor & Hughes, Wyman 3, c e½ nw se 30-20n-6w 750 3753
Freeman Oil Co., Sample 2, c w½ nw se 32-20n-6w 115 3108
Isabella County—
Twin Dr. Co., Rhode 1, nw sw sw 7-14n-5w ..... * 1360
Belvidere Oil Co.'s Morey 1, sw nw nw 28-13n-5w ..... * 1372
Montcalm County—
Leonard Pipe Line Co., Smeed 1, c sw nw 2-10n-5w ..... ¶1 996
Osceola—
Taggart Bros. Co., Louks 24, c ne 20-18n-10w ..... ¶10 1193
C. W. Teater, Baderschneider 3, c n½ se nw 30-18n-10w 200 3600
Pure, Mitchell 1, c n½ nw nw 30-18n-10w 100 3637
Lomp 4, c n½ ne ne 31-18n-10w.5000 3628
Ohio, Gingrich 3, c n½ nw nw 31-18n-10w 50 3634
Van Buren County—
Globe Dr. Co., Healey 1, sw se se 1-1s-14w 25 1268
H. L. Wheeler, Stadler 1, sw se sw 1-1s-14w 150 1276
Clapsaddle & Harris, Huntsburger 1, se se se 3-1s-14w..... 20 1299
Allen 2, se nw nw 12-1s-14w 120 1299
Bridger Basin, Holderman 1, se nw nw 11-1s-14w 40 1295
W. E. Dostson, Holderman 3, nw ne ne 11-1s-14w 95 1289
Lang & Lewis, Munn 2, ne se nw 11-1s-14w 25 1299

Mississippi

Yazoo County (Tinsley Dome)—
Hassie Hunt, Stutts 3, 30-10n-2w.. 648 4985
Mid-States Oil Corp., Cummings 9, 31-10n-2w 450 5039
Cummings 10, 31-10n-2w 450 5012
Sinclair-Wyoming, Sorrells 6, 29-10n-2w 608 5038
Sylvan Prod. Co., Sorrells 2, 32-10n-2w 240 5014
Union Prod. Co., Cowan 2, 26-10n-2w 140 4710
Yazoo County (Wildcat)—
Texas & Pacific C. & O. Co., Allgood 1, 10-11n-2w ..... * 6805

Montana

Glacier County (Cut Bank)—
Consolidated Gas Co., Tribal 2-208, se ne se 24-32n-6w 328 3029
Glacier Prod. Co., Maltby 3, csl se se 5-33n-5w 100 2812
Santa Rita O&G Co., Jordan 4, c ne se 7-32n-5w 190 2922
Rasmussen 6, cel ne se 32-35n-5w 120 2922
Texas Co., Gov't. 4-B, Lot 4, 18-32n-5w 119 2684
Toole County (Kevin)—
Big West Oil Co., Anderson 1, sw sw ne 12-35n-4w ..... * 2422
Colonel Kervin Oil Co., Gov't. 10, c nw ne 27-35n-3w ..... * 1705
Coolidge & Coolidge, Benjamin 1, c nw nw 9-33n-1w ..... ¶1½ 1260
Imperial Craig Co., Martin 6, cel se se 18-35n-1w 60 1639
M. F. Toles, Norum 12, sw se sw 33-35n-2w 50 1522
L. J. Yealy, Shaw 16, nw nw ne 35-36n-2w 20 1745

New Mexico

Eddy County—
E. L. Fulton et al, State 2, ne nw ne 36-17s-27e 90 525
Williams-Polyhar et al, Harbold 1, sec nw 35-17s-27e 100 422
Lea County (Monument)—
Polyhar et al, Williams-Repollo 2, sw se se 33-19s-37e 125 3895
Lea County (West Eunice)—
Wilson Oil Co., State 5, c nw se 13-21s-34e 1320 3691

OLD WELL DEEPENED

Chaves County—
Roxana Oil Co., Maull 1, sw ne nw 11-12s-25e .... * 1200

Nebraska

Lincoln County (Wallace Area)—
W. R. Miller, O'Connor 1, c nw 26-11n-34w ..... * 4840
Richardson County—
Skelly, Wallraff 5, 57 ft s of c n½ s½ 20-1n-16e 186 2326
Roesch 1, c n 1 n½ nw 36-3n-16e 680 2517

OLD WELL DEEPENED

Richardson County—
H. S. Campbell, Wamsley 1, c sw nw 8-1n-16e (otd 2376) (pb 2379½) 30 2446

New York

Allegany County—
Albert Oil Company, Swift farm, Bolivar 9 1269
B. & B. Oil Co., Curtis farm, Genesee 10 1390
R. J. Dermitt, Richardson farm, Bolivar 7 1277
Producers Oil Corp., "A," Keller-Scott farm, Wirt 7 1068
E. L. Clark et al, Jennings farm Bolivar 6 1279
Richardson Pet. Corp., Towner farm, Scio 6 1162
Hog Brook Oil Co., Reid farm, Alma 12 1388
McEnroe & Brown, Bellamy farm, Alma 6 1328
Harder-Mitchell et al, Bradley farm, Bolivar 6 1339
E. J. Phillips et al, Phillips farm, Bolivar 8 1462
Bohne Bros., Materna farm, Wellsville 9 1381
H. W. Patterson et al, Ockerman farm, Amity 5 740
Rico Oil Co., Alger farm, Scio..... 5 863
Sloan & Zook, Ramsdell farm, Bolivar 8 1386
New York Oil Co., Brown farm, Bolivar 6 1359
Shaner & Dermitt, Wetherby farm, Bolivar 10 1340
Bradley Prod. Corp., Coats farm, Wirt 7 1057
Water Intake Wells:
Vosburg Oil Co., Green farm, Bolivar 1286
Messer Oil Corp., Vosburg farm, Bolivar 1368
Vosburg farm, Bolivar 1377
Pure Penn Petroleum Corp., Mulkins farm, Bolivar 1422
Maple Oil Co., Hall-Herrick farm, Bolivar 1461
MacDonell Oil Co., MacDonell farm, Bolivar 1343
Ebenezer Oil Co., Vincent farm, Scio 1063
C. H. Christman & Son, Middaugh farm, Scio 1351
The Otsquago Oil Corp., Pike farm, Alma 1429
Albert Oil Co., Coats farm, Scio... .. 1076
Marsh Oil Co., Fay farm, Bolivar.. .. 1433
McEbenwood Oil Co., Lynch farm, Andover 1133
Harold Gowdy et al, Frederick farm, Alma 1368
H. W. Patterson et al, Browning farm, Scio 633
Browning farm, Scio 670
Bliven Hill Oil Co., Rogers farm, Amity 865
Messer Oil Corp., Beever farm, Wellville 970
F. J. Wilson, Burdick farm, Wirt.. .. 1437
Sawnet Oil Co., Merritt farm, Genesee 1426

Ohio

Athens County—
Ross Weimer & Ross, Wingett 2.. 5 398
Gibson et al, Van Dyke 12..... 5 439
Coshocton County—
Patton & Moore, Rine 1 .....¶2.52 3035
Gallia County—
C. A. Cody, Matthews 1.....¶0.09 1705
Hocking County—
Ohio Fuel, Sunday Creek Coal Co. 7008 .....¶0.59 1013
Holmes County—
Ohio Fuel, Oates 1..... * 3689
Knox County—
H. E. Perkins, Blair 2.....¶0.03 2705
Bell Bros., McCament 3.....¶0.03 885
Lawrence County—
Ohio Fuel, Ferguson 1.....¶0.09 2925
Licking County—
Fred W. Abbott et al, Caldwell & Currie 3 ..... 50 3048
Alten Willey et al, Darkes 1.....¶1.25 2573
C. A. Davis et al, Sawyer 1.....¶ 0.5 2547
Rutledge & Mossholder, Wooles 1. * 2500
Ohio Fuel, Benton 1.....¶1.33 2508
Medina County—
Ohio Fuel, Divoky 1.....¶0.6 3621
Smith 1 .....¶1.0 3518
Aldrich 2 ..... * 2730
Preston Oil Co., Griggsby CXL7.... 5 522
Grigsby F7 ..... 5 502
Grigsby G7 ..... 5 509
Harry Dempsey, Charles 1.....¶6.5 3377
A. Howells, Marquette 1.....¶0.3 3596
Meigs County—
Ohio Fuel, Carr 1.....¶2.9 1584
Bengal et al, Morris 2.....¶0.3 863
Monroe County—
Graham Oil, Adams 7..... 5 1500
Morgan County—
Litton & Radford, Matheney Hrs 1.¶0.5 4307
Muskingum County—
Industrial Gas Co., Miller 1..... . 3342
Pure Oil Co., Bibble 1.....¶1.6 4198
Noble County—
B C Robinson et al, Walker 13... 3 1040
John Asler, Marquis 1..... 1 1687
Chaseville Oil Co. et al, Kronenbitter 1 ..... 2 1561
Ohio Fuel, Ankrom 2.....¶0.06 1762
Perry County—
Preston Oil Co., Shaw 3..... 150 3206
Sunday Creek Coal Co. ..... * 1039
Wagner 1 ..... 177 3396
Pure Oil Co., Wilson 2..... 406 3188
Berry & Beard 3.....¶0.2 & 238 3185
Tuscarawas County—
Columbian Carbon Co., Wentling 1.. * 4528
Vinton County—
Henderson Oil Co., Thomas 4..... * 1045
Washington County—
Baker et al, Johnson 1.....¶0.28 1450
McCall Drlg. Co., Ewers 7..... 5 1602
Wayne County—
Kemrow Co., Musser 1.....¶0.04 3174

INPUT WELL

Medina County—
Preston Oil Co., Clapp LO5..... .. 517

OLD WELLS DRILLED DEEPER

Meigs County—
Guy Swadley, Fee 3 .....¶0.06 871
Washington County—
Ohio Fuel, Tresch 4 (otd 1285) .... * 1533

Oklahoma

Caddo County—
Texas Co., Maynahoma 1, sw sw ne 2-5n-12w 2340 3600
Grady County—
T. H. McCasland, Polsen 1, se c sw 27-3n-5w 32 1469
Jefferson County—
Seitz-Comeggs et al, Barrett 1, sw c sw 14-6s-6w ..... * 2005
King Bros. et al, Taylor 1, se se ne 18-7s-5w ..... * 865
Kiowa County—
Shell Pet., Ratliff 4, 19 ft n of ne se ne 19-7n-17w ..... ¶1 1498
Lincoln County—
Superior, Foruquet 1, c ne ne 17-13n-6e ..... * 4257
Dunnett, Luckinbil 2, sè se se 29-15n-5e 70 3543
Anderson & Prichard, McGuire 1, se se nw 20-18n-1e ..... * 5301
Marshall County—
Geo. Nell, Fee 1, ne c nw sw 31-7s-6e 15 474
Noble County—
Superior O&G, Robedeaux 1, ne nw ne 21-22n-1e ..... * 4760
Okfuskee County—
Shell, Hicks 4, sw sw ne 35-11n-8e 595 3423
Brewer 1, se sw nw 1-10n-8e (pb 4043) ..... * 4073
Leahmer 1-A, se ne sw 26-11n-8e 106 3443
Margay, Turner 1, ne ne sw 7-11n-8e 229 3694
Okmulgee County—
Walker, Moore 7, se c sw 1-13n-13e * 1273
L. W. Cranston, Fields 11, sw c ne sw 3-14n-14e ..... * 1214
Minchall & Lowery, Sims 3, 150 ft e of ne nw sw 30 2076
Payne County—
John Tomlinson et al, Williams 1, ne se nw 4-19n-2e ..... * 4955
Pottawatomie County—
C. L. Jinkins et al, Lightner 1, ne ne nw 4-5n-3e ..... * 2906
Champlin Ref., Walker 1, ne nw nw 16-5n-5e 240 2431
Sinclair Prairie, Rice "B" 3, nw nw ne 17-7n-4e (pb 4003) 219 4127
Barnsdall, Gunn 1A, ne se nw 16-7n-5e ..... * 4340
Kerlyn, Cherry 2, ne ne nw 32-8n-5e ..... * 4423
Mid-Continent, Krouch 2, se nw se 26-9n-4e (pb 4290) ..... * 4510
Seminole County—
Deep Rock et al, Work 1, ne ne ne 20-8n-8e (pb 3804) 15 4271
Baker 1, ne se ne 29-11n-8e (pb 3562) ..... * 3581
Carter, Mayhue 4, c s½ se sw 11-9n-6e (pb 2588) ..... * 3396
Mico, Ashbrook 1, sw sw nw 34-10n-8e ..... * 1574
Stephens County—
J. E. Jackson, Dilley 2, sw se se 6-3s-5w 20 1134

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth

OLD WELLS DEEPENED

Carter County—
Walter Neustadt, Choate 3, 110 ft w of c w½ nw nw 20-4s-2w (otd 1955) 240 2125
Creek County—
Sinclair Prairie, Gooden 8, sw nw se 16-17n-7e (otd 1508) 15 1520
Kiowa County—
Phillips Pet. Warner 1, ne ne se 19-7n-17w (otd 1057) 120 1135
G. R. Burke, Brazell 1, 180 ft n of ne ne ne 33-7n-17w (otd 1046).. * 1111
Pottawatomie County—
Daube, Garrett 2, se se sw 23-7n-4e (otd 4301) 11 4386

Southwest Pennsylvania

Armstrong County—
Apollo Gas Co., Brown 1.....¶0.11 3540
Butler County—
S. W. Deitrich, Mehaffey 1..... 5 1670
Clarion County—
Hanley & Bird, Wilson 2.....¶0.04 2669
T. Swartsfager et al, Reinsel 3....¶0.08 2774
Fayette County—
Scott et al, Church 1..... ¶0.4 1950
Marker Stephenson, Brojkovich 1..¶0.14 2018
Greene County—
Manufacturers Light & Heat Co., Tuston 3 .....¶0.21 3470
Morgan Henderson, Metz 5..... * 3645
Jefferson County—
T. W. Phillips Gas & Oil Co., Smith 2 ..... * 2950
Washington County—
Foley & Williams, Clark Heirs 1..¶0.26 1350
J. L. Dunn et al, Clark Heirs 1....¶0.28 1328

Texas Gulf Coast

Brazoria County Wildcat)—
H. E. Hamilton, J. M. Smith Est. 1 * 7010
Chambers County (Anahuac)—
Humble, Middleton 53 ..... * 7323
Fort Bend County (Clodine)—
Houston Oil, Thompson 2..... 165 7546
Galveston County (Red Fish Reef)—
Humble, Galveston Bay-State A-27. 178 9362
Hardin County (Wildcat)—
H. F. Baker, Minor Oil 1..... * 3239
Harris County (Dyersdale)—
Cockburn Oil Corp., Burkitt 26.... 367 4077
Harris County (Humble)—
Wilson Oil, R. E. Burt 9..... 39 2541
Harris County (Pierce Junction)—
Hamill & Smith, Gulf Fee 4..... 185 3326
Jefferson County (Fannett)—
Gulf, Marrs McLean 9-E..... 791 8517
Liberty County (Esperson)—
General Crude, T. G. Davis 28..... 79 8406
Liberty County (South Liberty)—
Harrison Oil Co., Chambers 2-A.... * 949
Sadler Production, Marrs McLean 5 * 1150
South Oil Co., C. A. Chambers 1.... * 3122
Matagorda County (Markham)—
Hamill & Hamill, Myers Bros. 1.. * 3553
Matagorda County (North Markham)—
Ohio Oil, Cornelius 4..... 128 8120
Tyler County (Wildcat)—
Stanolind, James Parker 1..... 218 8250
Wharton County (Withers)—
F. W. Mihcaux, Pierce Est. 1-A.... 227 5446
F. W. Michaux, Pierce Est. 26-A... 162 5415
Texas Co., Pierce Est. C-102..... 172 5392

East Texas

Kilgore Area—
John Wrather et al, I&GN Ry. 30-A 960 3599
Longview Area—
Magnolia, Goolsby 13 .....2400 3555
Roosth & Genecov, Smith 4 ..... 276 3693
Anderson County (Cayuga)—
Tide Water-Seaboard, J. N. Edens 16 ..... ¶85 4055
Freestone County (Cayuga Deep)—
Amerada, H. Berk 14 (Rodessa zone) ..... ¶19 7646
Freestone County (Long Lake)—
H. L. Hunt Oil Co., Cern 1 ..... * 5303
Henderson County (Opelika)—
Lone Stare-Shamrock, Allyn 2.... * 9741
Navarro County (Corsicana-Powell)—
R. W. Richmond et al, Fleming 1.. 9 2943
Smith County (Wildcat)—
B. F. Phillips et al, McComic 1.... * 4162
Wood County (Wildcat)—
A. L. Andree et al, Henry 1..... * 5274
Wood County (Hawkins)—
Humble, Cochrane 2 (10.59-ac).... 439 4860
Christian Womens Missions 2-B (103.41-ac) 314 4834
Edna Cumbie 1 (86/100-ac) 424 4846
J. Prince 1 (30.01-ac) 430 4882
N. M. Shamburger 2 (156.45-ac).. 330 4869
Red Iron Drlg. Co.-A. A. Folsom, H. Prince 1 (10-ac)..... * 4883
Texas Co., R. A. Cobb 4 (160.4-ac) 302 4754

West Texas

Andrews County (Emma)—
Texas Co., University 2-J 817 4325
Cochran County (Slaughter)—
Devonian-Honolulu, Saltmount, Dugan 9-A 1179 5060
Crane County (Wildcat)—
Continental Oil Co., Jones 1 (pb 6015) 83 6146
Crockett County (Todd Deep)—
Amerada et al, Todd 1-D ..... * 6367
Ector County (Foster)—
Schermerhorn Oil Corp., Johnson 16-B 255 4165
Ector County (Judkins)—
Gulf, Connell 18-B 664 3683
Gaines County (Seminole)—
Humble, Mathews 8 ..... 485 5350
Magnolia & Atlantic, H. & J. 3-189 ..... 270 5245
Gaines County (Wasson)—
Continental, Moore 2-47 ..... * 4997
Gaines County (Cedar Lake)—
Stanolind, American Warehouse 9.. 911 4740
Hockley County (Slaughter)—
Honolulu Oil Corp., Slaughter 22-B.1258 5045
Magnolia, Mallet 3-B 994 4995
Mallet 12-D 1307 5010
Mallet 17-J 1197 5035
Stanolind, Martin 2 ..... 342 4977
Slaughter 22-A 1149 5050
Texas Co., Mallet 10-B 1374 5030
Mallet 11-B 2009 5025
Mallet 16-E 1104 5055
Lubbock County (Wildcat)—
L. C. Harrison et al, Nairn 1..... 124 5002
Mitchell County (Northwest)—
A. R. Forster Oil Co., Mills 1-B.... 250 1691
Motley County (Wildcat)—
Humble, Matador 1-D ..... * 6269
Pecos County (Abell)—
Magnolia, Grove-State 1 ..... 216 5450
Stanolind, Rathjen 1 (nw pay).. 759 3950
Pecos County (Tobarg)—
Stanolind, Smith 14-B ..... * 503
Upton County (Gulf-McElroy)—
Gulf, McElroy 257 ..... 566 3140
Crier-McElroy 10-A 146 3039
Upton County (McCamey)—
T. P. Coal & Oil Co., Lane 47-A... 229 2155
Yoakum County (Wasson)—
American Liberty Oil Co., Bennett-Texaco 3-A 593 5278
Drlg. & Explo. Co., Inc., Randall-Humble 4-A 431 5112
Magnolia, Bennett 11 ..... 335 5265

OLD WELL DEEPENED

Conchoe County (Wildcat)—
C. M. Joiner Leasing Corp. (was R. C. Murray), Armor 1 (otd 1565). * 3424

North Texas

Archer County (Hull-Silk)—
Gulf, Siegel 25 (pb to 4144)..... 111 4358
R. C. Lipscomb et al, Wilson 7.... 768 3850
Archer County—
Deep Oil Dev. Co., Griffin 4-A..... 78 1625
Henry Grace et al, Wilson 2-B..... 97 1527
Morgan & Turner, Andrews 10-A... 26 1415
C. T. Robertson et al, Birdwell 1.. * 1400
Baylor County (Rendham)—
Paul B. Scott et al, Fayette 2..... 6 3026
Clay County (Antelope)—
Shell, Coburn 13..... 261 3220
Clay County (New York City)—
Shell, Willis 1 (pb to 6380) 233 6476
Clay County (Burns-Browning)—
L. T. Burns et al, Hodges 1..... 20 3939
Clay County—
Bridwell Oil Co., Roop 1..... * 1305
Harper & Knappenberger, Bilbrey 6 72 1175
Marvin Hudson et al, Taylor 1..... * 1158
Johnson & Kouri, Taylor 3-E..... 45 1132
Perkins & Cullum, Taylor 3-B..... * 1045
C. F. Schram et al, Summers 6-A.. * 1178
Cooke County—
High Point Oil Co., Fette 7..... 17 1134
E. W. Mudge, Jr., et al, Fette 8... 10 1136
Knox County (Wildcat)—
Seitz-Comegys & Seitz, Inc., Haskins 2 ..... * 1706
Montague County (Hults-Owens)—
L. E. Hults-Tom B. Owens, Brite 1 † 6028
Montague County (Benton-Holmes)—
Ross Drl. Co., St. Jo 1st Nat'l Bank 2 ..... 190 3712
Montague County—
Pure Oil Co., Crow 6..... 3 913
Jack Storey, Jr., et al, Salmon 3.. 15 937
Throckmorton County—
Cross & Peterson, Harrell 3..... * 973
Wichita County (K-M-A Ellenberger)—
Shell & Phillips, Griffin 39-E.....1360 4481
Wichita County (K-M-A)—
W. H. Hammon-Hanlon-Buchanan, Fassett-Tuttle 47 ..... 536 3989
Wichita County—
Perry Browning et al, Simpson 5.. 60 1770
Simpson 7 ..... 15 970
R-G Drl. Co., Warren 4..... 65 1770
Wolfe & Hull, Daume 8..... 9 696
Wichita County (Wildcat)—
Paul H. Sisk et al, Sisk 2..... 4 101
Young County—
W. F. Palmer et al, Campbell 7-D. * 964
Tex-Tor Oil Corp.-J. McLester, Moseley 5 .....1108 3812

GAS INTAKE WELL

Cooke County—
Trumter Pet. Co., Andress 1-B.... .. 765
Young County—
Reno Oil Co., Boren 16..... .. 1073

OLD WELL DEEPENED

Montague County—
Lesh & McCall, Davenport 4 (otd 2350) 325 2502

West Central Texas

Brown County—
D. C. Snellers et al, Smith 1..... ¶1 1515
Callahan County—
N. D. Heist et al, Isenhower 1..... 3 262
J. W. Hooser et al, Isenhower 1.... * 538
Marbert Oil Co., Hayden 1..... * 654
Ungren & Frazier, Burks 2..... * 1115
Yates & Brownsfield, Carpenter 1.. * 392
Coleman County (Wildcat)—
States Oil Corp., Hudson 1..... * 3890
Coleman County—
C. C. Collier et al, Stafford 1..... * 900
States Oil Corp., Morris 12..... 72 3587
Eastland County—
Hickok Prod. & Dev. Co., Wright-Harrell 1 ..... ¶5 3680
Jones County (Wildcat)—
Roeser & Pendleton, Inc., Moore 1. * 2367
Jones County—
Harry Hines et al, Wimberly 2.... 415 2230
Thos D. Humphrey et al, Triplett 5 † 1580
Shackelford County—
J. F. Baker et al, Davis 6..... 90 1546
Roeser-Pendleton & Conoco, Cook 6-A-117 ..... 99 1703
Ungren-Frazier & Rhodes Drlg. Co., Beck 1 ..... * 1670
Taylor County (Wildcat)—
Ungren-Frazier et al, Trinity University 1 ..... * 3047

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United States Well Completions—*Continued*

Texas Panhandle

Company, Well and Location	Init. Prod. Bbls.	Depth
Carson County—		
Cities Service Oil Co., Burnett 42-A	¶24.6	2846
Danciger O&R, Inc., Block 8	370	3138
Gray County—		
Skelly Oil Co., Schafer 137	352	3262
S. & M. Oil Co., Worley 13	41	3255
Hutchinson County—		
M. B. Armer, Inc., Luginbyle 1	199	3135
Gulf & Panhandle, Dial 107	108	3066
J. M. Huber Corp., Weatherly 18	588	3060
Phillips Pet. Co., Cockrell 84	258	3131
Shell, Harvey Sisters 35-B	323	3091
Harry Stekoll et al, Whittenburg 12-A	85	2842
Texas Co., Lewis 39	137	3066
Wheeler County—		
Smith Bros. Ref. Co., Harlan 15	17	2555
Johnson 18	33	2570

Southwest Texas

CORPUS CHRISTI DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Brooks County (Wildcat)—		
Allen & Morris, Kocker 1	*	2597
Jackson County (Lolita)—		
Humble, L. Ranch 21-A	600	5928
Magnolia, Ward Est 15	650	5928
Jackson County (Maurbro)—		
Humble, Mauritz 1-C	350	5233
Stanolind, McCrory 1	600	5243
Jackson County (West Ranch)—		
Magnolia, West 206-A	500	5099
West 208-A	500	5767
West 215-A	500	5750
Jackson County (W. Ganado)—		
Pure, E. T. Cravens 5	425	4847
J. R. Cravens 4	400	5553
L. Kuretsch 1	400	6304
T. N. Mauritz 1	¶2 & 50	6157
Jackson County (Wildcat)—		
J. L. Collins, Calloway 1	*	6025
Jim Wells County (Ben Bolt)—		
Bridwell, Elizondo 2, extends sd 1 mi ne	1000	4827
Jim Wells County (Seeligson)—		
Sun, P. Canales 3	450	5211
Jim Wells County (Wade City)—		
Henshaw et al, Schrade 1	500	4923
Nueces County (Agua Dulce)—		
Richardson, Knight & Jackson 2	650	7071
Nueces County (Bentonville-King)—		
Southern Minerals, Walker 16	400	5644
Nueces County (Luby)—		
Stanolind, McCann 19-A	450	5179
Nueces County (Minnie Bock)—		
Clark & Cox, Robertson 1	36	3825
Nueces County (N. Luby)—		
G. B. Buescher, Knight 1-A, new sand at 6959	400	7365
Nueces County (Stratton)—		
Chicago Corp., Wardner 26	550	6644
Gulf Plains, Moseley & Dryden, dual sand	¶100 & 250	7110
Southern Minerals, Stratton 30	400	6689
San Patricio County (Odem)—		
Seaboard, Lane 4, new sand	¶20 & 50	3548
San Patricio County (Wildcat)—		
L. A. Douglas, Odem 1	*	6941
Victoria County (Cologne)—		
Cox & Hamon, Balli 1 new sand	450	4890
Victoria County (N. McFadden)—		
Texas Gulf, Rush 1	¶35 & 100	5903

SAN ANTONIO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Bexar County (Gas Ridge)—		
Southwest Dr. Co., Covel 36	2	460
Caldwell County (Bee Creek)—		
R. R. Ogden, Talley 12	194	2313
Gonzales County (Wildcat)—		
Randon Oil Co., Dunning 1	*	6193
LaSalle County (Washburn)—		
Quintana, Washburn 1-B, new sd, extension, dual sand	¶20 & 1000	5700

LAREDO DISTRICT

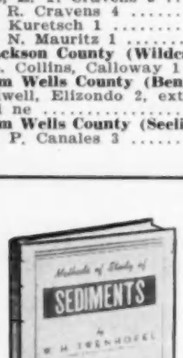
Company, Well and Location	Init. Prod. Bbls.	Depth
Duval County (Bridwell)—		
Bridwell, Parr 6	620	4328
Duval County (Hoffman)—		
Hickok & Reynolds, Ruiz 4	*	2700
Duval County (Kreis)—		
Ginther et al, Villareal 1	11	3217
Duval County (Piedre Lumbre)—		
Magnolia, DCRC 20-203	*	2377
Starr County (Rincon)—		
Continental, Slick 101-A	*	4452
Slick 113-A	650	4280
Slick 106-B	600	4255
Slick 107-B	300	4234
Starr County (Salinas)—		
Hagan & Stewart, Salinas 2-A, outpost	*	1690
Webb County (Killam)—		
O. W. Killam, Garcia-Villareal 20	80	2075
Webb County (Wildcat)—		
O. W. Killam, Puig 2	*	2637

West Virginia

Company, Well and Location	Init. Prod. Bbls.	Depth
Boone County—		
Pond Fork Oil & Gas Co., Fee 8	¶2.21 & 150	2873
Hope Natural, Canterbury 8580	¶	2238
Braxton County—		
Pittsburgh & W. Va. Gas Co., Norman 7850	¶0.05	2075
Cabel County—		
Vespa Drlg. Co., Armstrong Products Co. 1	¶0.08	2667
Calhoun County—		
Hope Natural Gas Co., Barr 8566	¶0.47	2191
Marshall 8751	¶0.7	1621
Everett Starcher, Starcher 1	¶0.01	2155
Clay County—		
Virginian Gasoline & Oil Co., Brown, Swann & Goshorn V-1306	*	1894
Doddridge County—		
L. G. Piggott, Scott 1	¶0.13	2744
Gilmer County—		
Clem Morriss et al, Barnes 1	¶0.03	2119
A. E. Ellis, Hall 1	¶0.63	1800
Jackson County—		
W. Va. Gas Corp., Faber 1	¶7.29	5185
R. E. McCabe, Hammack 1	¶6.63	5270
Godfrey L. Cabot, Inc., Putnam Co. 22	¶2.47	5351
Columbian Carbon Co., Sayre 1	¶0.44	5022
Marion County—		
South Penn., Cunningham 1	¶0.05 & 15	3142
Pleasants County—		
Schultz Oil Co., Riggs 2	¶0.12 & 2	1961
Putnam County—		
Adkins Gas Co., Fletcher 1	¶0.08	4305
Ritchie County—		
Square Oil Co., Carpenter 6	¶2.0	1930
Morris & Mercer, Eddy 1	*	1891
Schultz Oil Co., Hammett Heirs 10	65	1960
Taylor County—		
Pittsburgh & W. Va. Gas Co., Barton 6123	¶0.65	1096
Upshur County—		
Pittsburgh & W. Va. Gas Co., Summers 7839	¶0.1	4595
Cumberland & Allegheny Gas Co., Phillips 312	*	4364
Wayne County—		
Owens-Libby-Owens, Booth 1	¶0.11	3346

OLD WELLS DRILLED DEEPER

Company, Well and Location	Init. Prod. Bbls.	Depth
Jackson County—		
Joe Rubin, Maddox 1	¶0.07 & 4	5036
Ritchie County—		
William Schroeder, Burdridge 2	¶0.3	2014



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Refinery Association Buys 1500-Barrel Plant

The Cooperative Refinery Association, which operates a 3,400-barrel refinery at Phillipsburg, Kansas, has purchased the 1,500-barrel refinery of Terry Carpenter, Inc., Scottsbluff, Nebraska, it is announced by Howard A. Cowden, association president.

In purchasing the assets of the Scottsbluff corporation, the cooperative is getting title also to service stations and equipment located at Ogallala, Chappell, Sidney, Kimball, Bridgeport, Alliance, Scottsbluff, Grand Island, and North Platte, all in Nebraska.

Purchase price of the refinery and other facilities will come close to $750,000, Cowden said.

The topping plant of the Scottsbluff refinery was built in 1932 and was reconditioned when the cracking plant was built late in 1939 and early in 1940. The cracking plant began operations in April, 1940, shortly after CRA's cracking plant at Phillipsburg went into action. The Scottsbluff refinery is a new and modern plant.

The Scottsbluff plant gets crude oil from the Lance Creek field in Wyoming, some 130 miles away, taking the crude from an oil company pipe line that runs close to Scottsbluff.

WILDCAT REPORT
New Starts and Completions

ARKANSAS
COMPLETION

Union County—Atlantic & Phillips, Davis 1, ne nw 15-17-18, elev 232 ft, top Buckner 7027 ft, Smackover lime 7127 ft, porosity 7148 ft, perf csg 7166-68 ft, flowed 23 bbls 38-gr oil per hour 18/64-in ch, td 7370 ft.

CALIFORNIA
FIRST REPORTS

Fresno County—Wilshire Annex Oil Co.'s 21-26 E, 21-21-15, lcn.

Los Angeles County—A. J. O'Dell's O'Dell 1, 9-4-17, lcn. C. G. Willis & associates' Ferguson 1, 36-4-17, foundation. Fernando Oils., Ltd.'s 1, 18-2-16, lcn.

Tulare County—W. E. Goble's Goble 1, 28-16-23, drlg.

COMPLETIONS

Fresno County—Bandini Pet. Corp.'s S P 82-83, 23-15-17, abnd 6546 ft in Eocene.

Kern County—Shell Oil Co.'s Smith Cairns 2, 11-26-27, abnd 2491 ft in gray sand.

Los Angeles County — St. Anthony Oil Corp.'s Lassalle 1, 10-3-16, abnd 5416 ft.

ILLINOIS
FIRST REPORTS

Clay County—Longhorn Oil Co. et al's Harman 1, s½ nw sw 36-5n-7e, dr.

Coles County—Carter's Haybrook 1, c e½ se sw 2-13n-7e, lcn.

Crawford County—Ohio's Ducommun 28, nw se se ne 35-6n-13w, lcn.

Edgar County—Raymond H. Pogue's Honnold 1, nw sw ne 14-12n-14w, lcn.

Effingham County—Gulf's Eralman 1, c sw nw sw 11-8n-6e, lcn.

Franklin County—Oil Carriers, Inc.'s Sims Hrs. 1, se se sw 29-7s-1e, dr.

Jasper County—R. G. Harberger's Frichitel 1, s½ sw ne 29-7n-10e, lcn. Joe Carroll et al's Miller 1, s½ nw sw 32-7n-10e, lcn.

Richland County—Ohio's Hull 1, w½ nw ne 20-2n-14w, lcn.

St. Clair County—Ed Gieck's Unknown 1, ne ne se 5-3s-7w, dr.

Wabash County—White & Wiskwire's Courter 1, se sw se 21-1n-12w, lcn.

Washington County—Schachtsiek's Newton 1, se nw ne ne 4-3s-4w, dr.

Wayne County—Swan-King Oil Co.'s Spencer 1, w½ se ne 28-1s-6e, dr. B. H. Matlon's Hanison 1, w½ sw nw 19-2s-8e, lcn.

White County—P. E. Tipton's Jolly Est. 1, n½ nw sw 21-3s-14w, lcn. A. H. Anderson's Leathers 1, ne se sw ne 12-4s-10e, lcn. Pure & Carter's Meel 2, sw c ne ne 18-6s-9e, dr. Cherry-Kidd et al's Ackerman 1, ne nw nw 13-6s-10e, lcn.

COMPLETIONS

Clay County—Lain Oil & Gas Co.'s Aldrich 1, n½ ne se 26-4n-5e, abnd 2838 ft.

Douglas County—Ill.-Mid-Continent's Bragg 1, c ne nw ne 33-16n-9e, abnd 700 ft.

Edwards County—N. K. Menefee's McDowell 1, s½ se ne 31-1n-11e, abnd 3299 ft. Central Pipe Line Co.'s Kent-Stremme 1, e½ se ne 31-2n-14w, McClosky 3116-3123 ft, td 3123 ft, flow 1504 bbls oil.

Franklin County—E. S. Adkins' Whaley 1, se sw se 35-5s-2e, abnd 2904 ft. Carter Oil's US Coal & Coke Co. 1, sw se nw 20-6s-4e, abnd 3265 ft.

Marion County—C. C. Nye's Long 1, c w½ nw nw 27-3n-4e, abnd 2684 ft.

Richland County—R. D. Martin's Deischer 1, w½ nw sw 26-2n-10e, abnd 3331 ft. Ohio's Lambert 1, s½ se nw 17-2n-14w, McClosky 3124-26 ft, 3137-47 ft, td 3149 ft, 90 bbls oil.

Shelby County—R. J. McFarland's Cozalet 1, se se se 6-12n-2e, abnd 1475 ft.

KANSAS
FIRST REPORTS

Barton County—W. W. Drilling's Kraft 1, c s½ sw nw 36-16s-11w, brr. Alladin Pet.'s Kowalsky 1, c n½ ne sw 32-20-11w, surface. Kiowa Drlg.'s Christiansen 1, c e½ ne sw 17-20s-12w, mim.

Jefferson County—O. J. Connell's Edmond 1, c sw ne 21-9s-20e, lcn.

Leavenworth County—E. V. Jackson's Winkler 1, c se nw 34-7s-20e, lcn.

Pawnee County—Skelly et al's Yeager 1, c w 1 sw sw 32-22s-15w, surface.

Reno County—Central Pet. & Iron Drlg.'s Phillips 1, c w½ nw ne 2-23s-10w, mim.

Rooks County—Geo. Vance et al's Moos 1, c e½ se se 6-9s-17w, mim.

Sumner County—E. B. Shawver's Kemp 1, se se se 8-35s-2e, rot. rig.

COMPLETIONS

Brown County—Hiawatha Comm.'s Yaussi 1, c w½ ne ne, Hunton 2660-2766 ft, abnd 2766 ft.

Ellis County—Falcon-Seaboard Oil's Wasinger 1, ne ne se 20-11s-18w, Whipstock 550 ft, Ft. Riley 2065 ft, Florence 2165 ft, Cottonwood 2360 ft, Neva 2410 ft, Topeka 2940 ft, stains 3137-49 ft, Lansing 3193 ft, Base K. C. 3443 ft, Congl. 3457 ft, Simpson 3488 ft, Simpson Dolo. 3498 ft, Arbuckle 3516 ft, 3050 gals acid, si 3 hrs, swb 2 hrs, end test 95 percent water, abnd. Central Pet. & Derby Oil et al's Lang 1, c n½ ne nw 20-13s-16w, Anhy. 1144 ft, Ft. Riley 2050 ft, Florence 2150 ft, Wreford 2220 ft, Topeka 2975 ft, Lansing 3250 ft, Base K. C. 3483 ft, Congl. 3499 ft, Arbuckle 3568-85 ft, abnd.

Harvey County—Nelson Drlg. et al's Hitz 1, se se nw 4-24s-1w, Anhy. 675 ft, Ft. Riley 1880 ft, Neva 2285 ft, Topeka 2977 ft, Lansing 3473 ft, Viola 3801 ft, cored 3860-67 ft, 2 ft 9-in dense dolo, bleeding oil, Simpson 3996 ft, Arbuckle 3999-4032 ft, td, pb 3880 ft, cem 7-in 3850 ft, drld cem to 3882 ft, pb 3840 ft, shot 3800-10 ft, squeezed, shot 3800-05 ft, shot 3808-12½ ft, shot 3804-14 ft, 1000 gals acid, gauged 6,399,000 cubic ft gas.

Leavenworth County—Sherrod et al's Carr 1, c sw ne 13-10s-20e, abnd.

Pratt County—A. R. Jones et al's Eubank 1, c n½ ne sw 11-27s-14w, Anhy. 925 ft, Ft. Riley 2240 ft, Base Cottonwood 2660 ft, Neva 2685 ft, Lansing 3905 ft, Oolitic zone 3916-19 ft, 3928 ft, 3946 ft, no show. Base K. C. 4230 ft, Miss. 4379 ft, Kinderhook 4400 ft, Viola 4436 ft, Simpson 4522 ft, Arbuckle 4615 ft, td 4715 ft, abnd. Luther P. MacKall's Thornton 1, c e½ se nw 14-29s-13w, Anhy. 726 ft, Ft. Riley 2175 ft, Topeka 3345 ft, Lansing 3919 ft, Viola 4518 ft, Cherty Congl. 4405 ft, Miss. 4442 ft, Simpson 4635 ft, Arbuckle 4735 ft, water 4738-45 ft, no show, abnd 4777 ft.

SOUTH LOUISIANA
FIRST REPORTS

Pointe Coupee Parish — Humble's Pointe Coupee Land Copany 1, Morganza area, sec 9-19s-8e, lcn.

Rapides Parish—Placid Oil's Bentley Lbr. Co. 1, being at point 2640 ft e of sw cor of sec. Go 1980 ft n & 660 ft w to ctr of ne¼ sw¼ sec 11-4s-5w.

COMPLETIONS

Plaquemines Parish — Phillips Petroleum's LLE-Fee, Bastian Bay, sec 38-20s-29e, td 10,170, orig completed 8-7-41 at 9350-56 ft for 324 bbls daily thru 5/32-in chke, Squ & reperf 9137-70, flowed 140 bbls 16½ hrs ⅝-in chke, 55 gr. Reperf 6566-70 ft, flowed dry gas. Reperf 6200 ft level, flowed 31 bbls 51 gr distillate on test. Reperf 9353-56 ft, flowing 65 bbls daily thru ¼-in chke, tp 2850, gor 10,000-1, gr 41. Opens field.

NORTH LOUISIANA
FIRST REPORTS

Bossier Parish—Geo. W. Dawley, Sentell-Dickson 1, se nw 10-20n-13w, lcn.

Catahoula Parish—Carter & Phillips Goodpine F-1, c ne se 26-6n-5e, rig. H. L. Hunt, Tensas Delta A-1, c sw ne 7-4n-5e, rig. C. H. Calvert, Tensas Delta 1, ne nw 36-7n-6e, dr 3789 ft.

Caldwell Parish—H. L. Hunt, Trout 1, c se sw 16-14n-4e, rig.

DeSoto Parish—Hunter Co., Iva Baker 1, nw nw 6-11n-14w, rig.

COMPLETIONS

Catahoula Parish—O. C. Borah, Womack 1, irreg sec 54-9n-5e, abnd 5570 ft.

Natchitoches Parish—H. L. Hunt, Goodpine F-14, c sw nw 36-13n-6w, abnd 5790 ft.

Winn Parish—H. L. Hunt, Goodpine F-11, c se nw 35-10n-3w, abnd 3980 ft.

MISSISSIPPI
FIRST REPORT

Issaquena County—John Gholson et al, Oden 1, nw ne 31-9n-6w, rig.

COMPLETION

Yazoo County—Texas & Pacific Coal & Oil Co., J. S. Allgood 1, 660 ft s & e nwc 10-11n-2w, elev 265 ft, top Cane River 1390 ft, Tallahatta 1693 ft, Wilcox 2047 ft, Selma chalk 5114 ft, Tuscaloosa 6770 ft, abnd 6805 ft.

MICHIGAN
FIRST REPORTS

Allegan County—M. and S. Oil & Gas Co.'s Gretzinger 1, se nw nw 28-3n-15w, lcn.

Huron County—Wallace Markle's Ackerman 1, sw sw sw 8-17n-14e, rig.

Isabella County—Rex Oil & Gas Co.'s Babcock 1, ne sw ne 18-13n-6w, dr.

Oceana County—E. B. Strom's Benjamin 1, c e½ ne sw 1-16n-17w, lcn.

Schoolcraft County—B. B. Pattison's Veshure 1, nw ne ne 14-42n-16w, lcn.

Van Buren County—Sun's Buys 1, se se se 5-3n-14w, rig.

NEBRASKA
COMPLETION

Lincoln County—W. R. Miller et al's Frank O'Connor 1, c nw 26-11n-34w, Wallace district, abnd 4840 ft in granite wash topped 4818 ft. Surface elev 3163 ft.

NEW MEXICO
FIRST REPORTS

Eddy County—L. H. Choate-C. W. Brown's State-Hover 1, c ne ne 2-17s-30e, lcn.

Otero County—Fred Turner, Jr., et al's Turner 1, nw 23-26s-16e, rust.

OKLAHOMA
FIRST REPORTS

Creek County—Central Commercial Oil Co.'s Bruce 1, ne ne nw 33-17n-10e, dr. Anderson & Pitchard's Wood 1, ne ne sw 18-15n-7e, lcn. Shell Oil Co.'s Bishop 1, ne ne sw 12-15n-8e, lcn.

Logan County—Cities Service's Babcock 1, se ne ne 10-15n-4w, lcn.

McIntosh County—Phillips Petroleum's McVey 1, c w½ se ne 1-10n-13e, spud.

Pottawatomie County—Crosbie et al's (name unknown) nw nw nw 11-9n-4e, mit.

COMPLETIONS

Carter County—Lloyd Sanders' Harmon 1, ne se sw 21-1s-2w, sand 305-25 ft, sand 325-30 ft, show gas 840-68 ft, blk shale 1010-1475 ft, abnd 1475 ft.

Garvin County—Ohio Oil's Freeman 1, se se se 14-1n-1w, gas 645-55 and 1066-82 ft, cored 1627-30 ft, 3 ft hard lime, cored 1630-35 ft, 3 ft brown shale, base Pontotoc 2470 ft, cored 3160-65 ft, cored 3800-12 ft, shale dip 35°, td 4365 ft, perf 715-725 ft, show gas—hole full water, pb 1705 ft, tested shallow sands, hole full salt water, abnd.

Kiowa County—Artie Baker's Coakley 1, nw ne se 30-7n-17w, lime 1135-55 ft, td 1287 ft, pb 1235 ft, acid 6500 gals, abnd 1287 ft.

Logan County—Harry Miller et al's Katscher 1, c ne sw 7-16n-2w, Viola 5502 ft, Dense 5555 ft, Dolomite 5585 ft, Dolomite 5613 ft, cored 5600-20 ft, 3 ft dense limestone, cored 5650-55 ft, 4½ ft dense dolomite. Permeability & saturation zero; porosity 1.3 to 3.3, cired 5690-95 ft, 3 ft grn shale, cored 5848 to 49 ft 8-in, 8-in sand, cored 5861-66 3½ ft, stain & odor, cored 5866-71 ft, 2½ ft part spotted—bottom 6-in barren pb 5800 ft, packer 5758 ft, tested to 5830 ft, water, abnd.

Pontotoc County—W. A. Delaney's Norris 1, sw sw ne 3-3n-6e, Wewoka 320 ft, Wetumpka 560 ft, Cal. 610 ft, Senora sd 730 ft, Senora lime 795 ft, Atoka 1055 ft, abnd 1805 ft.

Okfuskee County—Cochran & Anderson's Parks 1, nw nw se 30-12n-8e, Inola 3305 ft, brown lime 3408 ft, abnd 3610 ft.

Seminole County—Domar Oil's Smith 1, se se ne 29-8n-8e, Misener 4352 ft, Hunt 4354 ft, cored 4377-89 ft, 7 ft hard dome, stain & odor, Syl. 4398 ft, Viola 4493 ft, Dense 4528 ft, Dolomite 4563 ft, 1st Wilcox 4590 ft, ran Schl. perf 4360-90 ft in Hunton, 1000 gals acid, flowed 125 bbls oil 5 hrs, some water, decreased to 15 bbls oil per hr and shut in, opened and flowed 120 bbls oil, 3000 gals acid, flw 80 bbls oil per day, flw 60 bbls oil per day pulled tbg & swb, flow 70 bbls oil. Stanolind-Amerada's Buck 1, nw se nw 11-10n-7e, brown lime 3310 ft, Glic. 3465 ft, Cromwell 3560 ft, cored 3396-3411 ft, 8 ft white sand, cored 3565-70 ft, 1 ft limey sand, cored 3570-73 ft, 1½ ft sand, cored 3573-77 ft, 4 ft sand, Hunton 4100 ft, Syl. 4200 ft, Viola 4299 ft, Dense 4327 ft, Dolomite 4333 ft, Wilcox 4354 ft, 2nd Wilcox 4395 ft, DST 4362-82 ft, rec 80 ft, oil and 250 ft oily mud, Schl. td 4415 ft, indicated oil in Cromwell and 1st Wilcox, 3 bbls oil 10 gals wtr per hr, shot both sands, dd to 4435 ft, 200 ft wtr per hr from 4432-35 ft, pb 4395 ft, completed for 90 bbls oil per day.

Wagoner County—Ruso Drilling Co.'s Cornelius 1, nw nw ses 5-16n-17e, Dutcher 854-65 ft, td 865 ft, 8500 mcfg.

WEST TEXAS
FIRST REPORTS

Lubbock County—L. B. Benton & Henry Roach's Texas Land & Mtg. Co.-Stanolind 1, c sw sw HE&WT sec 64, blk 20, lcn.

Winkler County—Union Oil of Cal.'s Driver-Amerada 1, c nw nw PSL sec 19, blk B-6, rur 4200-ft test.

COMPLETIONS

Concho County—C. M. Joiner Leasing Corp. (was Sam Murray's) Armor 1, sw sw T&NO sec 105, blk 72, dd from 1565 ft, elev 2059 ft, top Ellenberger 3169 ft, abnd 3424 ft.

Crane County—Continental Oil Co.'s Jones 1, c n¼ of n¼ H&TC sec 12, blk 3, new pool, elev 2474 ft, base Permian and top detrital 5490 ft, Simpson 5545 ft, Ellenberger 6045-6146 ft, pb to 6015 ft, pay 5720-40 and 5905-

[Continued on next page]

WEST TEXAS—Continued

21 ft, acidized, flowed 83 bbls initial 5/16-in with flow valves.

Lubbock County—L. C. Harrison et al's Nairn 1, c se se sec 25, blk A, J. H. Gibson sur, new pool, elev 3203 ft, top Yates frosted grains 1930 ft, lime 2690 ft, San Andres 3100 ft, Clear Fork 4345 ft, Pay 4893-5002 ft, nitro shot and acidized, pump 124 bbls 25-gr oil and 41 bbls water initial.

Pecos County—Stanolind's L. Rathjen 1, c lot 14, H&GN sec 26, blk 9, ne extension and new pay Abell field, elev 2368 ft, middle Permian pay 3885-3950 ft, flowed 758 bbls 36-gr oil ½-in natural, gas-oil ratio 480/1.

SOUTHWEST TEXAS

FIRST REPORTS

Jackson County—Boyle & Mayo's Rodesney 1, Rambo sur, 2½ mi nw Mauritz fld, loc for 6500 ft test.

Jim Wells County—Bridwell Oil Co.'s Blake 1, Trinidad Gr, 4.2 mi s Ben Bolt, loc for 5700 ft test.

Milam County—Trans-State Oil Co.'s Von Gonton 1, S. C. Robertson sur, 2 mi w Minerva-Rockdale fld, loc for 1500 ft test.

Nueces County—Nueces Royalty Co.'s W. C. Tiller 1, Sec 20, 8000 ft ne N. Luby fld, loc for 7500 ft test.

San Patricio County—Tide Water Associated's S. A. Loan & Trust Co. 1, McAuley sur, 3 mi sw Sinton, loc for 7000 ft test.

Starr County—Magnolia's Hinojosa 2, Por 110, 3 mi sw Viboras, sp on 5000 ft test.

Webb County—Forest Dev. Corp.'s Hoogterp 1, Sur 1110, 2 mi nw Mirando City, cor b 1100 feet.

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Williamson County—John F. Camp & Sons' Nelson 1, Moore sur, 6 mi s Taylor, sp on 1500 ft test.

Wilson County—W. L. Marshall's Pierdolla 1, San Miguel sur, 2 mi w Lavernia, loc for 1200 ft test.

COMPLETIONS

Brooks County—Allen & Morris' Hocker 1, Palo Blanco gr, Palo Blanco pros, abnd 2597 ft.

Gonzales County—Randon Prod. Co.'s Dunning 1, Dillard sur, 8½ mi s Gonzales, abnd 6193 ft.

Jackson County—J. L. Collins & Co.'s Calloway 1, Linn sur, 6 mi nw Texana fld, abnd 6025 ft.

LaSalle County—Quintana Pet. Co.'s Washburn 1-B, Sec 89, 1¼ mi sw Washburn fld, dual sd well, perf 5530 ft w/286 shots, f 405.72 bpd 40.3-gr plo ¼ 525 lb wp, gor 425-1; perf 4822-32 ft w/32 est 20,000 mcf open f, 1480 lbs cfp, thru ¼ f some dist 1180 lbs tp, 1350 lbs cp, extends fld, new sd.

Nueces County—G. B. Buescher et al's Knight 1-A, Petronnila sector, N. Luby fld, perf 6959-64 ft, f 76.5 bpd 44 gr plo ⅛ ch 1920 lbs tp, 2480 lbs cp, gor 4880/1 new sd.

San Patricio County—Seaboard Oil Corp.'s S. L. Lane 1, Odem, perf 3541-46 ft, f 2500 mcf g 5 bpd 56-gr dist ¼ ch, 1350 lbs tp, 1425 lbs cp, L. A. Douglas' Odem 1, Shelton sur, 5 mi se Odem, abnd 6941 ft.

Victoria County—Cox & Hamon's Balli 1, Cologne, perf 4640-42 ft, f 77.28 bpd 7/64 ch 1250 lbs tp, 1740 lbs cp, gor 1450-1, first crude producer in 4600-ft sd.

Webb County—O. W. Killam's V. L. Puig 2, Albercas gr, 10 mi s Mirando City, abnd 2637 ft.

NORTH TEXAS

FIRST REPORTS

Archer County—Golding & Cochran's M. J. Kunkel 1, 467 ft out of swc of sw 30-ac BBB&C sec 11, A-54, lcn 5300-ft Ordovician.

Jack County—Jim Robinson et al's J. J. Powers 1, 511 ft from e and 1480 ft from s lines w½ of M. Hunt sur A-298, lcn.

COMPLETIONS

Knox County — Seitz-Comegys & Seitz's Haskins 2, nwc e½ BBB&C sec 216, blk A, 100 ft n 5012-ft failure, abnd 1706 ft.

Wichita County—Paul H. Sisk et al's Sisk 2, blk 15, leag 2, Denton CSL, new pool, pump 4 bbls o.s. 98-100 ft, td 101 ft.

Young County—Thos. D. Humphrey et al's Williamson 1-A, nwc sw TE&L sec 300, new pay Williamson pool, top Bend 3975 ft, Mississippian 4982 ft, td 5046 ft, pb to 4000 ft, acidized Bend perforations 3968-78 ft, pump 98 bbls 42-gravity oil plus 125 bbls water

WEST CENTRAL TEXAS

FIRST REPORTS

Comanche County—J. C. Hamer et al's Mary Smith 2, 600 ft from s and 1000 ft from e lines BBB&C Ry sec 31, A-76, lcn.

Jones County—Butler & Horne Drl. Co.'s Murfee 1, 660 ft n and w of swc E. Dickinson sur, but in Jones Boston sur No. 276, mim.

COMPLETIONS

Coleman County—States Oil Corp 's Hudson 1, swc GH&H sec 74, blk 2, abnd 3890 ft.

Jones County—Roeser & Pendleton, Inc.'s Moore 1, nec s½ T&P sec 33, blk 15, elev 1618 ft, abnd hfw 2363-67 ft.

Taylor County — Ungren-Frazier et al's Trinity University 1, sec lot 2, Grimes CSL leag 148, elev 1844 ft, abnd hfw 3040-47 ft.

EAST TEXAS

FIRST REPORTS

Angelina County—W. C. Durham et al's C. E. Walton-Magnolia 1, 150 ft from s line tr and 150 ft e of rr, L. Holloway sur, rur for Wilcox test.

Navarro County—Lyman T. Davis et al's W. R. Stevenson 1, 330 ft from n and 990 ft from w lines 120-ac tr, T. J. Jordan sur, rur.

Van Zandt County—H. B. Ownby Drlg. Co.-E. L. Smith's C. E. Bogue 1, 1650 ft from n and 330 ft from m/e/w line 145-ac tr, south Marshall University sur, elev 467 ft, Pecan chalk 2485-2615 ft, dr 3570 ft.

COMPLETIONS

Smith County—B. F. Phillips et al's McCormic 1, most e/se cor 385-ac tr, W. W. Avery sur, elev 330 ft, top Woodbine between 3680-96 ft, Georgetown 4020 ft, abnd 4162 ft.

Wood County—A. L. Andree et al's Henry 1, nec 140-ac tr, J. Ewing sur, Golden prospect, elev 418 ft, Pecan chalk 2819-3123 ft, Austin 4249-4550 ft, top Woodbine between 5229-40 ft, abnd 5274 ft.

TEXAS GULF COAST

FIRST REPORTS

Brazos County—Phillips Petroleum's M. F. Mitchell 1, 1½ mi nw Millican, J. M. Barrera Sur, 467 ft from sl of sur & lse & 467 ft from el of 20-ac lse, pd 7000 ft, lcn.

Jefferson County—W. P. Luse's Kemp 1, 3 mi se of Fannett, Davis Burrell sur, 467 ft from nl & 467 ft from el of 110-ac lse, pd 9500 ft, lcn.

San Jacinto County—Shell's Central Coal & Coke, 1½ mi ne of Mercy, James Robinson sur, A-45, 990 ft from nwl & 990 ft from nel of sur, pd 10,000 ft, moving in materials.

Walker County—J. O. Ehlinger's Frazier & Campbell 1, 7 mi s Huntsville, B. Walker sur, blk 35, 330 ft fr nwl & 330 ft fr swl of blk 35, pd 2500 ft, lcn.

COMPLETIONS

Brazoria County—H. E. Hamilton's J. M. Smith Est. 1, se Lockridge, J. W. Hall sur, td 7010 ft, abnd.

Hardin County—H. F. Baker's Minor Oil Company 1, flank Sour Lake field, S. Jackson sur, td 3239 ft, abnd.

Tyler County—Stanolind's James F. Parker et al 1, C. T. W. Collins sur, td 8250 ft, perf 8180-8200 ft with 120 shots, flowed 218 bbls daily thru ¼-in chke, tp 350, cp 1200, gor 278-1, 39.5 gr, opens Wilcox sand field.

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MEN IN THE INDUSTRY'S NEWS

HARRY E. HESTER, for five years head of the service department of Medearis Oilwell Supply Company, is now on the sales staff of McCullough Tool Company, working out of Los Angeles. He has been engaged in servicing and selling oil tools in California for more than 12 years. He also is secretary-treasurer of Permian Investment Company, dealing in oil leases and royalties.

J. N. FLANAGAN, 53, West Texas oil operator, died November 3 in a Tulsa hospital. He was en route from his Midland home to Rochester, Minnesota.

DR. L. S. ECHOLS, JR., research chemist for Shell Oil Company, has been transferred from the Deer Park, Texas, refinery to the development department in New York City. Mrs. Echols, the former Dorothy Jung, geologist for Republic Production Company, has resigned effective December 1, to join Dr. Echols in New York.

WILLIAM E. SCHOENECK, division petroleum engineer at Shreveport for the Ohio Oil Company, has been transferred to Mt. Pleasant, Michigan, as division petroleum engineer.

D. W. AKINS, JR., who has been division engineer in the East Texas district for The Ohio Oil Co., has been moved to Shreveport, where he is division engineer in that district.

JACK SIMON, who has been assistant engineer for The Ohio Oil Company in East Texas, has been promoted to division engineer.

W. J. THOMAS, who has spent 9 years with the process equipment division of the Babcock & Wilcox Company, Barberton, Ohio, has been transferred to the executive department of the sales offices of The Babcock & Wilcox Tube Company at Beaver Falls, Pennsylvania.

JOSEPH E. MOORHEAD, executive manager of the Pennsylvania Grade Crude Oil Association, Oil City, Pennsylvania, has been appointed to the national Panel of Arbitrators of the American Arbitration Association.

G. E. ARCHIE, Shell Oil Company, Houston, will give a paper on "The Use of Electrical Resistivity Logs to Determine Some Reservoir Characteristics" before the East Texas Section of the American Institute of Mining and Metallurgical Engineers at Kilgore, Tuesday evening, November 18. John Murrell is program committee chairman.

CLAUD B. HAMILL, Houston oil man, has been appointed Congressional district chairman for the defense saving staff of Texas.

ROBERT GRANT has joined Young Radiator Company, Racine, Wisconsin, in a production and managerial capacity.

COLONEL W. F. ROCKWELL, president of Pittsburgh Equitable Meter Company, has been called to active military duty at Washington where he is serving as assistant to the chief of the motor transport division. Captain A. E. Higgins, vice president, called last summer to duty in the Air Corps, has been temporarily deferred due to defense activities in which the firm is engaged. For eight months, Captain J. R. Spreat of sales staff has been stationed at Fort Meade.

CHARLES W. SANGER, 70, who carried on wildcat operations for nearly 20 years in general vicinity of Abilene, Texas, died November 8. He was a native of Washington state, and moved to Abilene in 1919.

EARL E. IVES, Cities Service Oil Company, Bartlesville, Oklahoma, has been transferred to Oklahoma City.

K. M. HICKMAN is a new man in the scouting department of The Texas Company, Tulsa.

E. K. SCHLUNTZ, petroleum engineer, Shell Oil Company, is now located at Wirt, Oklahoma, after transfer from the Tulsa office.

W. L. HORNER of Core Laboratories, Inc., gave a paper on "Productivity, Measurable Reservoir Characteristics and Well Spacing" before the Houston Geological Society, November 13. At the November 20 meeting, W. L. Craig, chemistry professor at Texas Technological College, will give a paper on "The Spectograph as a Possible Tool for Correlation of Strata."

J. J. LEU, assistant general sales manager, of New York City, headed a group of some 60 sales representatives, consisting of sales managers, sales engineers, technical and sales promotion men of the American Oil Company, the marketing subsidiary of the Pan American Petroleum & Transport Company, on a trip to Houston recently.

MANLY B. BROWN has been appointed as manager of sales, pipe division, Republic Steel Corporation, N. J. Clarke, vice president in charge of sales, has announced. Brown has been with Republic since December, 1936, as assistant manager of sales, pipe division. He formerly was associated with the Wilson & Bennett Manufacturing Company as eastern sales manager, and prior to that was Chicago representative of the Ohio Corrugating Company. For 8 years he was in the Chicago sales department of the Wheeling Steel Corporation. During the first World War he spent 2 years in France.

WILLIAM A. BLAKEMORE, civil engineer for Gulf Oil Corporation, Houston, died November 8. He was a graduate of the University of Arkansas, and was a World War veteran. He had lived in Houston since 1916.

W. C. WHALEY, who succeeded R. A. Broomfield as general manager of California operations of Barnsdall Oil Company on November 1, is a native Californian, born in Santa Maria on April 29, 1894, whose first job was in the oil fields and who has been working in the oil industry ever since. Whaley joined Barnsdall under Fred A. Fortine, as a driller in 1924. He has been drilling foreman, field superintendent, general superintendent, vice president and general superintendent, and now, with the retirement of Broomfield from active service, vice president and general manager of California operations. He has been a Barnsdall director since 1940.

In addition to being vice president and general manager of his company for California. Whaley is president of the California Petroleum Safety Board, a cooperative safety group of independent oil companies; is a member of the Production Committee for District No. 5 under the Office of Petroleum Coordinator for the National Defense; is a past chairman of the Drilling Practices Committee of the American Petroleum Institute; and has been active in the voluntary conservation program of the California oil industry since its inception in 1929. At the present time he is a member of the Conservation Committee of California Oil Producers and is chairman of the Allocation Sub-Committee of that group.

ARTHUR D. JONES, scout for Pure Oil Company, died at his home in Oklahoma City, November 9.

MRS. SARA PORTER FITZGERALD, 54, wife of Charles Fitzgerald, assistant to the president of the Sinclair Refining Company, pipe line department, died November 10 at Fort Worth.

H. R. CULLEN, Houston oil man, has been made a member of the petroleum committee of the South Texas Chamber of Commerce.

C. W. MOORE has ben made general credit manager of Wickwire Spencer Steel Company, 500 Fifth Avenue, New York City. Simultaneously, W. H. Carlson has been made assistant credit manager. Moore first joined the Wickwire Spencer in 1930, serving in the credit department of the company's Tulsa office. In December, 1931, he was transferred to Worcester, Massachusetts, where he remained until 1936, at which time he was appointed Pacific Coast credit manager, which position he has held until now.

Prior to his Wickwire Spencer affiliation, Moore was credit manager of the Oklahoma Iron Works and International Supply Company at Tulsa. Moore and Carlson will be located in the company's Worcester, Massachusetts, office, 80 Webster Street.

Squeaks from the Bull Wheel

Justifiable Carving

"Whut'd you all do effen somebody stole yo' gal?"

"Ah'd sho' cut his 'quaintance."

"Da's zacky whut Ah did brutha, and did Ah cut him deep?"

Sign Language

Letter from College Student: "Dear Dad—Gue$$ what I need mo$t of all. That'$ right. $end it along? Be$t wihe. Your $on, Tom.

Letter from Dad to Son: "Dear Tom: NOthing ever happens here. We kNOw you like your school. Write us aNOther letter aNOn. Jimmie was asking about you Monday. NOw we have to say good-by."

Learned Quickiy

"What does this expression 'Sezz you' mean?" asked the judge.

The clerk of the court replied: "My lord, it appears that this is a slang expression of American origin which has gained regrettable currency in the language of our people through the insidious agency of the cinema, and is, I am led to understand, employed to indicate a state of dubiety in the mind of the speaker as to the veracity, or credibility of a statement made to him."

"O, yeah!" said the judge.

Slanguage

They laid him out on the police floor and the cop who brought him in stood by while the doctor examined him. Finally the doctor arose and said, "That man's been drugged." The cop went white and shivered. "That's right, sir, it's my fault. I drug him six blocks."

Dialectics

"Sistah Jones, I'se takin' up a collection fo' de benefit of our worthy pastah," exclaimed one of the brethen. "You know, he's leavin' us fo' to take a church down in Mobile, an' we thought we'd get together an' give him a little momentum!"

An Eye for Trouble

The English tell a story about a reluctant conscript asked by the army oculist to read a chart. "What chart?" asked the draftee. "Just sit down in that chair and I'll show you." "What chair?" asked the man. Deferred because of bad eyesight, the draftee went to a nearby movie. When the lights came on, he was horrified to discover the oculist in the next seat. "Excuse me," said the conscript as calmly as he could, "does this bus go to Shipley?"

Salesmanship

"Say, what makes it jerk so when you put it in gear?"

"Ah, that proves it's a real car! It's anxious to start!"

An Easy One

"Say, Phil, what do you do with your old clothes?"

"Simple enough. I just take 'em off at night and put 'em on again next morning."

Trick?

A harried looking man rushed into a barroom, looking furtively around him, and whispered to the bartender:

"Give me a drink—quick—before the trouble begins."

The bartender scurried to pour out the drink, which the gentleman gulped down in a swallow, shoving the empty glass back and hissing:

"Another one, quick, before the trouble begins."

The bartender hastily obeyed and when he had watched the second drink disappear he could no longer refrain from inquiring what the trouble was that was about to begin.

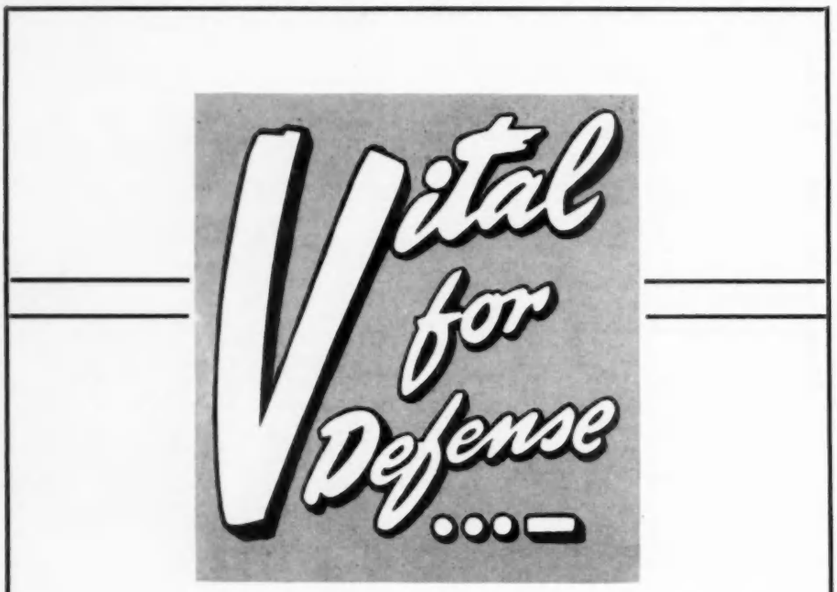
"It begins right now," said the stranger. " I got no money to pay for these drinks."

Accommodating Miss

A very nice old lady had a few words to say to her granddaughter.

"My dear," said the old lady, "I wish you would do something for me. There are two words I wish you would promise me never to use. One is 'swell' and the other is 'lousy.' Would you promise me that?"

"Why, sure, Granny," said the girl, "what are the words?"



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Forms PD 25C and D—Customer's Certificate of Defense Requirements.

Form PD 73—Customer's Statement to Producer Classifying Purchase Order or Contract for Steel.

Forms PD 83A and D—Steel Warehouse Statement of Deliveries and Classification Instructions.

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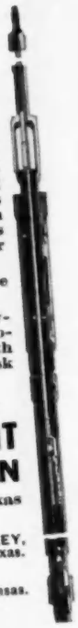

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NOTES FOR THE Equipment Buyer and User

Meter

WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania, has announced a new combination watt-hour and thermal demand meter, especially developed to meet continued extension of demand rates to smaller loads, available in standard house size, case and mounting.

With a-c ratings of 5, 15 and 50 ampere capacities, 120 to 240 volts, 2 and 3 wire for reading up to 20 kilowatts, the unit is similar to the ordinary watt-hour meter in general appearance.

The watt-hour mechanism has standard adjustments for full load, light load, and power factor; the thermal unit has only 2 adjustments for zero and for full scale.

Microphotometer

LEEDS & NORTHRUP COMPANY

Leeds & Northrup Company, 4934 Stenton Avenue, Philadelphia, has announced a new recording microphotometer, a rapid and convenient method for analyzing spectrographic plates or films in research and industrial laboratories. Because the plates or films are mechanically scanned by a motor-driven scanning unit, and the relative positions and densities of spectrum lines are automatically recorded by an I&N Speedomax Recorder, this new recording microphotometer eliminates the eyestrain and "human equation" of visual methods, and does away with the delays and limitations of photographic processes. Quick determinations of elements present in small percentages are made possible by pen-and-ink records of standard and test spectrograms drawn at high speed on one chart.

Designed to accommodate plates or films as large as 4 inches high by 10 inches wide, the scanning unit includes on a heavy cast base, an optical system, a plate stage, a drive mechanism for the plate stage, an a-c operated amplifier and all necessary controls grouped at a convenient location. In indicating and recording relative positions and densities of spectrum lines, the response of the Speedomax recorder to density changes is so immediate and so rapid that in less than 1.5 seconds the pen moves from one position and comes to rest at its new position—even across the entire width of the 9-inch chart. Pen position can be read at a glance on an indicating scale as the record is being drawn. No unusual skills are required to operate this new microphotometer. Anyone familiar in a general way with instruments can quickly learn to use it.

Fatigue of Metals

Fatigue of metals, discussed from the point of view of the designing engineer by D. Landau, and issued by The Nitralloy Corporation, 230 Park Avenue, New York City, carries much in its discussion which should prove helpful to the engineer charged with maintenance of equipment and with the ever-increasing problem of prolonging the life of units now on hand in the face of increasing difficulties in the obtaining of replacements. The booklet treats fatigue mathematically, and is well illustrated with charts and diagrams showing applications of the formulas used.

Pump Seal

CRANE PACKING COMPANY

Crane Packing Company, 1800 Cuyler Avenue, Chicago, has announced the new bellows-type Seal, listing the following as principal features:

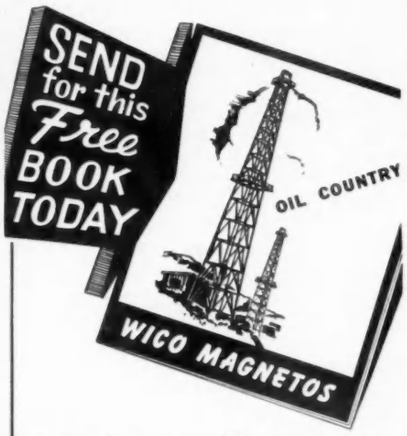
Seal has only 2 parts: bellows and spring. Bellows is an exclusive synthetic rubber compound found to be excellent for sealing services; grease, oils, salt water, alcohols and anti-freeze do not affect it. Installed partially compressed; ready for instant seal.

Crane Pump Packing

Entire unit (bellows and spring) is spring driven and operates as a driving coupling. Seal does not touch or have a sliding contact with the shaft: rust, corrosion and deposit do not interfere with or reduce efficiency. Bellows connects two flanged ends. Spring is placed in a fixed position against the inside shoulders of the flanged ends and so holds the contact facings against the sealing washer on the one end and the driving base on the other.

Because of the seal's ability to flex and compress as a unit, pressure variation, misalignment, fan thrust, torque or vibration set up by an unbalanced impeller, are automatically accommodated or compensated for. The serrated contact facings are responsible for the positive seal at both the washer and driving base points. These facings are formed in a series of concentric grooves and flat-faced ribs, effecting seal with a suction-action.

Among other advantages is "blindfold" installation. Seal cannot be installed wrong either on the assembly line or in the field. Both ends are identical—either end is right.



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See Page 1325 in COMPOSITE CATALOG. 1941

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2061 Southport **Chicago, Ill.**

Motor Control
GENERAL ELECTRIC COMPANY

General Electric Company, Schenectady, New York, has announced a new electronic control system called Thymo-trol to provide simple, stepless control of direct current motors for alternating current lines wherever a wide speed range is needed.

Normally consisting of 3 separate units—a small control station, a transformer, and a thyraton tube panel—the control is the first to provide in one equipment the means for electronically starting, stopping, accelerating and regulating the speed of a motor. Standard units will cover motor sizes up to 5 horsepower, 230 volts.

Perforator, Packoff
OTIS PRESSURE CONTROL, INC.

The Otis Wire Line Tubing Perforator Service and Packoff Anchor are said to provide a means to remove mud or water from back of a casing packer without contaminating or exposing the lower pay and make possible the use of the casing annulus to inject gas to flow the well. The complete operation is made under pressure with an ordinary steel measuring line and does not require erecting derrick, moving tubing, or breaking packer seal.

Most common usage is in wells where pressure has been depleted to such an extent that the oil column loads up in the tubing, making it necessary to kickoff the well with some external source of gas. Where such conditions exist, it has become a common operation to set a removable tubing stop just above the packer, drop in a back pressure valve to keep the mud off the sand face, cut holes in the tubing with an Otis Perforator, using the stop as a base, circulate all the mud out of the casing annulus, and through the annulus inject gas to kick off the well. The packoff anchor is run to regulate the gas entering the tubing through the perforations.

The wire line tubing perforator consists of a wedge, 2 knives and a knife base. Taper of the tapered wedge is sufficiently small to cause the impacts from an ordinary set of tubing jars to force the knives through the tubing walls. The knives retract with an upward pull on the line, permitting the tools to be easily removed.

Packoff anchor consists of 2 parts, packoff section and tubing stop. Purpose of the packoff section is to control the flow through tubing perforations, whereas the tubing stop serves 2 purposes; first, as a stop and base for the perforating job and secondly, as an

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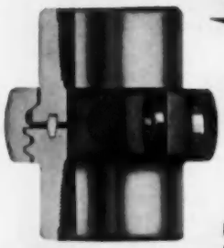

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Atlas Catalog for details.

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anchor and guide for the packoff section.

Removable tubing stop is simply a tapered mandrel on which are mounted 3 slips held together by a slip carrier. The slips point downward and utilize all downward forces and impacts to further secure the lock. The stop is run and pulled with a Type H Otis running tool.

Packoff section consists of 2 sealing cup assemblies connected by a spacer nipple. Tool is designed so that when it sets down on the stop one cup assembly is above and the other below the tubing perforations. This restricts all flow through perforations to that which will pass through the orifice between the cup assemblies.

New York Nomads Start Fall Activities

Meeting last Wednesday at the Waldorf-Astoria Hotel in New York City for its first luncheon of this fall, the New York chapter of Nomads formally inducted into its membership Barton A. Myers, director of International Petroleum Company, Toronto, Canada. Myers became the first honorary member of the New York chapter. Earlier this year he had been unanimously elected by the Nomads' board of regents. Myers gave a brief address on "Canada at War."

In the course of the luncheon three men were elected to regular membership. These were: Frederick M. Alexander, Union Carbide Company, New York; R. B. Gilmour, Cardwell Manufacturing Company, Wichita, Kansas; Brinton Welser, Chain Belt Company, Milwaukee. Two new associate members were elected: Edward L. Carter, Shaffer Tool Works, New York; and Douglas C. Lance, Gulf Publishing Company, New York.

Among many guests present at the meeting was one from abroad, Al Thornton, United British Oils of Trinidad, Ltd., Trinidad.

Geophysical Service Capital Stock Purchased

Eugene McDermott, president of Geophysical Service, Inc., announces the purchase of all the company's capital stock by himself and three associates, H. B. Peacock of Houston, Cecil H. Green of Dallas, and J. E. Jonsson of Dallas.

Geophysical Service Inc. has been engaged in geophysical exploration work in the United States and in countries all over the world for many years. It is credited with finding more than 150 new oil fields. Its home office and research laboratories are located in Dallas, and branch offices are located in Houston and Tulsa.

Management of the company will be continued under the leadership of Eugene McDermott as president, with Peacock and Green serving as vice presidents. J. E. Jonsson is secretary and treasurer.

Heating Control

The Bristol Company, Waterbury, Connecticut, has issued a bulletin describing an automatic heating-cycle control system in operation on furnaces for annealing malleable iron castings.

It describes the cycle of operation, instruments, control valves, and safety devices. It is claimed that the installation decreases annealing time by 15 to 20 percent, eliminating need for manual regulation and assuring a uniform product.

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